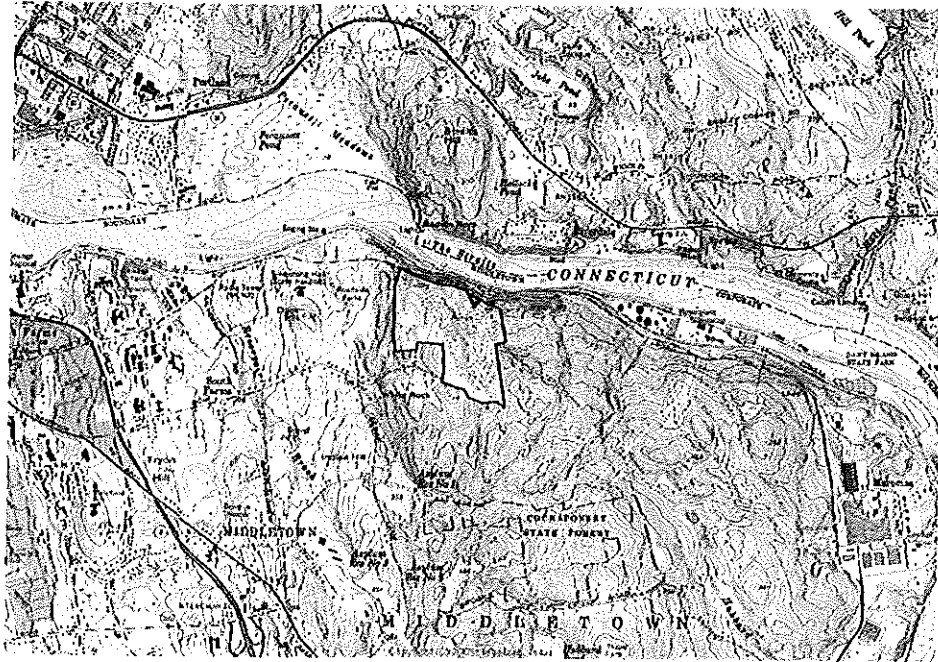


Kleen Energy Systems Project Middletown, Connecticut



Environmental Report in Support of Location Approvals

**Volume I
November 21, 2001**

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TABLE OF CONTENTS

1.0	EXECUTIVE SUMMARY	1-1
2.0	PROJECT DESCRIPTION	2-1
2.1	INTRODUCTION	2-1
2.1.1	<i>Organization of the Document.....</i>	<i>2-1</i>
2.2	PROJECT DESCRIPTION.....	2-1
2.2.1	<i>Type, Size and Proposed Use of Project.....</i>	<i>2-1</i>
2.2.2	<i>Project Substation.....</i>	<i>2-3</i>
2.3	PHYSICAL CHARACTERISTICS OF THE PROJECT AND SURROUNDINGS	2-3
2.3.1	<i>Site and Area Description.....</i>	<i>2-3</i>
2.3.1.1	Site Location	2-3
2.3.1.2	Environmental Setting	2-4
2.3.2	<i>Primary Project Components: Layout and Appearance.....</i>	<i>2-4</i>
2.3.3	<i>Project Components and Process Description</i>	<i>2-6</i>
2.3.4	<i>Air Emission Control</i>	<i>2-7</i>
2.3.5	<i>Water and Wastewater.....</i>	<i>2-8</i>
2.3.6	<i>Utility Interconnections</i>	<i>2-8</i>
2.3.6.1	Electrical Interconnections.....	2-9
2.3.7	<i>Instrumentation and Controls.....</i>	<i>2-9</i>
2.3.8	<i>Solid and Hazardous Waste Generation and Disposal</i>	<i>2-9</i>
2.3.9	<i>Chemical and Petroleum Storage and Handling.....</i>	<i>2-10</i>
2.3.9.1	Chemical Storage Requirements.....	2-10
2.3.9.2	Petroleum Storage Requirements.....	2-11
2.3.9.3	Project's Spill Prevention and Control Design	2-12
2.3.10	<i>Protection Systems.....</i>	<i>2-13</i>
2.3.10.1	Fire Protection Water Supply and Routing.....	2-13
2.4	PROJECT CONSTRUCTION.....	2-14
2.5	PROJECT OPERATION	2-15
3.0	PROJECT NEED AND PUBLIC BENEFITS	3-1
3.1	REGULATORY CONTEXT	3-1
3.2	PUBLIC BENEFIT OF THE PROJECT	3-1
4.0	ENVIRONMENTAL SETTING, POTENTIAL IMPACTS AND MITIGATION MEASURES	4-1
4.1	LAND USE AND ZONING.....	4-1
4.1.1	<i>Land Use.....</i>	<i>4-1</i>
4.1.2	<i>Zoning.....</i>	<i>4-4</i>
4.2	COMMUNITY FACILITIES AND RECREATIONAL RESOURCES	4-7
4.2.1	<i>Community Facilities and Recreational Facilities Inventory.....</i>	<i>4-7</i>
4.2.2	<i>Project Impacts on Community Facilities.....</i>	<i>4-9</i>
4.2.3	<i>Conclusion</i>	<i>4-10</i>
4.3	VISUAL RESOURCES.....	4-10
4.3.1	<i>Existing Environmental Setting.....</i>	<i>4-10</i>

4.3.2	<i>Visual Resource Identification</i>	4-13
4.3.3	<i>Potential Visual Impacts on the Project Area</i>	4-13
4.3.4	<i>Conclusion</i>	4-17
4.4	NOISE ANALYSIS.....	4-17
4.4.1	<i>Noise</i>	4-17
4.5	TRAFFIC ANALYSIS	4-19
4.5.1	<i>Existing Roadway Geometry</i>	4-19
4.5.2	<i>Site Access</i>	4-20
4.5.3	<i>Trip Generation</i>	4-22
4.6	HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES.....	4-24
4.7	ECOLOGY AND WILDLIFE.....	4-24
4.7.1	<i>Background</i>	4-24
4.7.1.1	<i>Existing Vegetative Communities</i>	4-25
4.7.1.2	<i>Early-Phase Old Field</i>	4-25
4.7.1.3	<i>Shrub Community - Speckled Alder</i>	4-26
4.7.1.4	<i>Wetland and Watercourse Vegetation</i>	4-26
4.7.2	<i>Expected Wildlife Species</i>	4-26
4.7.3	<i>Project Effects on Wildlife</i>	4-27
4.7.3.1	<i>Terrestrial Species</i>	4-27
4.7.3.2	<i>Wetland and Aquatic Species</i>	4-28
4.8	AIR QUALITY	4-28
5.0	INLAND WETLANDS AND WATERCOURSE RESOURCES.....	5-1
5.1	INTRODUCTION	5-1
5.2	WETLAND AND WATERCOURSE INVENTORY.....	5-1
5.2.1	<i>Inland Resource Determination Methodology</i>	5-1
5.2.2	<i>Inland Resource Delineations</i>	5-1
5.2.3	<i>Wetland and Watercourse Functional Assessment Summary</i>	5-2
5.3	WETLAND/WATERCOURSE DESCRIPTIONS AND FUNCTIONAL ATTRIBUTES.....	5-5
5.3.1	<i>Areas 1 and 1A (Watercourse- Open Water/Wetland Scrub-shrub fringe)</i>	5-5
5.3.2	<i>Area 2 (Intermittent Watercourse)</i>	5-5
5.3.3	<i>Area 3 (Emergent Wetland/Pond)</i>	5-6
5.3.4	<i>Area 4 (Perennial Watercourse)</i>	5-7
5.3.5	<i>Area 5 (Isolated Emergent Wetland)</i>	5-7
5.3.6	<i>Area 6 (Emergent Wetland)</i>	5-7
5.3.7	<i>Area 7 (Emergent Wetland)</i>	5-8
5.3.8	<i>Area 8 (Emergent Wetland)</i>	5-8
5.3.9	<i>Area 9 (Emergent Wetland)</i>	5-9
5.4	WETLAND FUNCTIONAL VALUES AND IMPACT ASSESSMENT	5-9
5.4.1	<i>Functions and Value Assessment Methodology</i>	5-9
5.4.2	<i>Wetland Functional Assessment</i>	5-10
5.4.2.1	<i>Watercourse/Wetlands Areas 1-4, 6,7, and 9</i>	5-10
5.4.2.2	<i>Potential Impact on Functional Attributes of Areas 1-4,6,7 and 9</i>	5-11
5.4.3	<i>Isolated Wetlands (Areas 5 and 8)</i>	5-11
5.4.3.1	<i>Nutrient and Sediment Trapping</i>	5-12
5.4.3.2	<i>Wildlife Habitat</i>	5-12
5.4.3.3	<i>Potential Impact of Functional Attributes of Areas 5 and 8</i>	5-12

5.5	WETLAND MITIGATION PLAN	5-12
5.5.1	<i>Sediment and Erosion Control Measures</i>	5-12
5.5.2	<i>Proposed Wetland Restoration and Compensation</i>	5-13
5.5.2.1	Soils.....	5-14
5.5.2.2	Vegetation	5-14
5.5.2.3	Proposed Post-Construction Monitoring and Reporting.....	5-15

FIGURES

Figure 2.1-1:	Site Location Map.....	2-2
Figure 2.3-1:	Site Location Plan.....	2-5
Figure 4.1-1:	Middletown Zoning Map (One-mile radius of Project site)	4-5
Figure 4.2-1:	Community Facilities.....	4-8
Figure 4.3-1:	Project Site.....	4-11
Figure 4.3-2:	Project Site Photograph.....	4-12
Figure 4.3-3:	Visual Photograph Locations.....	4-14
Figure 4.3-4:	Looking East Toward Site From Bow Lane	4-15
Figure 4.3-5:	View Looking Southeast Toward Site From Glenview Terrace.....	4-16
Figure 4.3-6:	View Looking South Toward Site From Wellwyn Drive.....	4-18
Figure 4.5-1:	Site Area Roadway Intersections	4-21
Figure 4.5-2:	Existing Traffic Volumes.....	4-23

TABLES

Table 5-1	Summary of Regulated Areas, Impacts, and Mitigation	5-3
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1.0 EXECUTIVE SUMMARY

Kleen Energy Systems, LLC is proposing to build a new 520 megawatt (MW, nominal capacity) combined cycle generating station in Middlesex County, Middletown, Connecticut ("the Project"). The Project will be fueled primarily with natural gas, but will also be able to burn low sulfur distillate No. 2 fuel oil as a backup fuel. The Project will be among the cleanest in the world, meeting the emission limits for the cleanest projects in Connecticut.

The Project has a 345 kV electric transmission abutting the site and a high pressure interstate gas transmission line about 1 mile away. Property under control of Armetta and Associates, one of the Project proponents, controls property north of the Project site with frontage on the Connecticut River in its tidal reach, which provides the opportunity for the Project to employ an evaporative cooling tower and benefit from the increased efficiencies inherent in this cooling technology.

The Project will be located in an existing Special Industrial Zone (I-3) on River Road at the site of the old Feldspar Corporation mine. This will locate the Project nearly ¼ mile from the nearest residential receptor. Locating the Project on a previously mined area, that was a fairly steep hillside, presents some civil engineering challenges, however the proximity of gas and electric infrastructure and a usable source of freshwater more than compensates for the difficult topography. The solution to the engineering challenge also brings with it benefits. Fitting the Project into the hillside results in the Project having very low visibility from most directions.

The Project represents a unique opportunity to reclaim an abandoned mine that has very few alternative uses. Any project that would use the mined area would be faced with the same substantial civil works and would quickly conclude that other land areas that did not require this effort was a better alternative. It is the unique proximity of an adequate gas supply, electric transmission and an abundant water source that makes this location a reasonable site for a generation project. Only a project with a substantial capital investment, like a generation project, could support the investment needed to reclaim the abandoned mine site.

Reclaiming the abandoned mine site has other benefits, particularly the opportunity to stabilize the site so that it is not a source of other environmental damage, especially erosion and sedimentation into the Connecticut River. Reconfiguring the site will allow for the creation of a comprehensive stormwater management plan that will control the quality of site runoff, as well as provide improved aquatic habitat.

The Kleen Energy Project will provide a new highly reliable and efficient source of electricity to Connecticut, while also enhancing competition by bringing a new entrant into the supplier mix. It will result in a substantial investment in Middletown and the attendant increase in tax revenue. It will displace existing more polluting generation resulting in improvements in regional air quality. The Project is a unique opportunity to benefit Connecticut statewide, Middletown and the environment.

2.0 PROJECT DESCRIPTION

2.1 Introduction

Kleen Energy Systems LLC is proposing to site, construct, and operate two (2) new combined cycle, natural gas fired combustion turbines (CT) in the Maromas section of the City of Middletown, Middlesex County, Connecticut. The Project location is shown in Figure 2.1-1. Kleen Energy Systems LLC will build and operate the generating facility.

The objective of this document is to describe existing environmental conditions, potential environmental impacts, and mitigation measures of the proposed Kleen Energy Generating Facility in support of requests for location approvals from the Middletown Planning and Zoning Commission and the Middletown Inland Wetlands Commission. For purposes of this document, the proposed facility is herein referred to as the "Kleen Energy Generating Facility," "proposed facility" or "the Project."

2.1.1 Organization of the Document

This Document is organized as follows:

Section 1.0 is the Executive Summary which contains a summary of the proposed project, purpose, and environmental impacts.

Section 2.0 is the Project Description which contains a description of the proposed project; a brief description of the proposed project site environmental conditions; a summary of the permits and approvals required; and this description of the document format.

Section 3.0 is the Project Need and Public Benefits, which sets out the regulatory context of the granting of location approvals and explains the benefits the Project will bring to the State of Connecticut and to the competitive electricity markets.

Section 4.0 is the Environmental Setting and Impact Assessment that provides a discussion of specific environmental study areas (e.g. Air Quality, Water Resources, Noise, Cultural Resources, etc.). Each environmental resource area is addressed with a discussion of existing conditions and an evaluation of potential impacts.

2.2 Project Description

2.2.1 Type, Size and Proposed Use of Project

The Project is a 520 MW (nominal) natural gas-fired combined-cycle electric generating facility. It will supply electricity to the regional grid as an exempt wholesale generator as defined by federal regulations. The Project will participate in the new wholesale electricity market, selling at market-determined prices, thereby providing competitively-priced electrical energy to Connecticut consumers. The Project will be a merchant facility developed, constructed, and operated using private funding sources and placing no risk on Connecticut electricity consumers.

The Project will include two nominal 172 MW General Electric (GE) 7FA combustion turbines (CTs) and associated heat recovery steam generators (HRSGs). The CTs will be equipped with dry low nitrogen oxide (NO_x) combustors and have a combined nominal generating capacity of 344 MW (net). The HRSGs will be connected to a steam turbine generator, which will extract energy from the steam generated by the CT exhaust heat in the HRSGs and provide the rest of the 520 MW (nominal) electric capacity. The configuration of two gas turbines and one steam turbine is commonly referred to as a "2 on 1" combined-cycle configuration. By utilizing the otherwise wasted heat from the CTs, the combined-cycle facility will be more efficient than simple-cycle CTs and existing steam-cycle power plants. The facility will be fired primarily with natural gas, with low sulfur distillate No. 2 fuel oil used as a backup.

The majority of the power generation equipment will be housed within a building containing the gas turbines and their associated subsystems and equipment, the steam turbine and its associated systems, a control complex which includes the control room, water sampling lab, electrical switchgear and electrical distribution systems. There will be a separate water treatment building and gas compressor building. The plant will use an evaporative cooling tower to provide condenser cooling to condense the steam turbine exhaust so that it may be recycled back to the HRSGs. The cooling tower will be supplied with water from wells adjacent to the tidal reach of the Connecticut River.

2.2.2 Project Substation

Each generating unit will have a generation stepup transformer that will convert electricity generated at 18 kV in the generators to the transmission line voltage of 345 kV. The connection to the transmission line will be through a new switchyard that will be built north of the generation building on a flat terrace that will be excavated out of an area that has been subject to intense quarrying.

The switchyard arrangement is based on a 345 kV "breaker and one half" configuration. This arrangement provides for 3 connections to the power plant, and three connections for outgoing transmission lines. The three connections to the power plant are for each of the 3 generator step-up transformers. Two outgoing transmission connections would loop the existing transmission line into the switchyard and would be the primary connections to the transmission system. The third outgoing connection would provide for a future 345 kV transmission line to a new substation by Connecticut Light and Power which could be used to provide an autotransformer connection between the 345 kV and 115 kV transmission systems.

2.3 Physical Characteristics of the Project and Surroundings

2.3.1 Site and Area Description

2.3.1.1 Site Location

The Project site is zoned in a Special Industrial (I-3) Area. The site consists of approximately 137 acres, bounded to the south by Bow Lane, to the east by land owned by CL&P, to the west by largely vacant land owned by the State of Connecticut, zoned for residential use (R-45) and to

the North by River Road, a rail line, property owned by Armetta and Associates and the Connecticut River. The Project site lies entirely within the limits of the City of Middletown. The facility site location details are shown on Figure 2.3-1 and in Volume II, Drawing C11. Volume II of this application is a compilation of engineering drawings for the Project and present additional Project detail.

River Road runs by the Project site and to the east to the existing NRG generation station. There the road is gated and generally closed. Beyond the gate is the Pratt & Whitney (P&W) jet engine manufacturing plant which is a secure installation. The gate on River Road can be opened to provide emergency access either to, or through, the P&W site. Hence, the only traffic using River Road by the site is associated with the NRG plant.

The Project site is highly disturbed and has been intensively used as a quarry for many decades. The Project has a goal of reusing as much of the severely disturbed areas of the site as possible, thereby limiting the Project's impacts to less disturbed areas that provide higher quality natural habitat. The site is steeply sloped, reaching its highest elevations at its southern boundary and sloping to the north down to River Road and the Connecticut River.

2.3.1.2 Environmental Setting

The Project site lies on the eastern side of Middletown, fronting on the Connecticut River. Middletown is in Middlesex County and is about 4.5 miles south on Route 9 from the intersection of I-91 and Route 9. The Project site is about 3 miles due east of the Middletown business district and about 2.6 miles from the intersection of Route 9 and Silver Street, which would be expected to be the principal access route to the site.

The Project site is at the western end of a larger I-3 Special Industrial Zone that includes the existing NRG Middletown Generating Station, and the Pratt & Whitney aircraft engine manufacturing plant. The Project is being located on the eastern side of the site which has the combined benefits of maximizing reuse of previously disturbed areas and providing a buffer left in a natural state between the Project and existing or potential residences. A CL&P 345-kV transmission line abuts the site at the eastern edge and a high pressure gas transmission line is about 1 mile further east at the NRG Middletown Generating Station.

2.3.2 Primary Project Components: Layout and Appearance

The Project design and layout was carefully planned to minimize its impact to the surrounding community and the environment. The Project will consist of the power generation building, containing the administration areas, control room, gas turbines, steam turbine, water sampling lab, and electrical switchgear; two HRSGs with exhaust stacks; an evaporative cooling tower; ammonia storage; water treatment buildings and tanks; a stormwater management system; access roadways; a security fence around the facility; interconnections to the electric transmission system and water and wastewater systems; and a gas metering station with gas infrastructure internal to the site, to be supplied by a lateral off of an existing interstate natural gas pipeline.

The most prominent structures associated with the Project are the generation building at about 95 feet high; and the exhaust stacks, expected to be about 200 feet high. The cooling tower is proposed to be located at the rear (southern portion) of the site. The generation building and ancillary power block facilities are located to the north on a terrace that will also contain the cooling towers. The switchyard will be located further to the north on a terrace about 100 feet lower than the power block. Because of the steep slopes in the area, the view of the Project should be very limited from most directions. The only area from which the plant will be particularly noticeable will be from the top of the Connecticut River gorge along the northern riverbank (Town of Portland).

2.3.3 Project Components and Process Description

The facility will be comprised of the following five main areas: main power generation area, water treatment systems, wastewater collection systems, electrical switchyard and staff facilities. A listing of each proposed area, with the main structures that will be constructed for those areas and a brief description of their function is provided below.

- Main Power Generation Area
 - Steam turbine and CT building enclosures – house the power generation equipment and provide sound attenuation
 - Gas metering area – receiving point for pipeline natural gas flow
 - HRSGs – boilers that create steam from the CT exhaust and also house the air pollution control equipment
 - Evaporative Cooling Tower – provides condenser cooling of the steam turbine exhaust
 - Electrical/battery room building – houses Project electrical control systems and emergency backup power
 - CEMS buildings – houses exhaust gas analyzers to continuously monitor air emissions
- Tanks and Water Treatment Systems
 - Water treatment building – houses control systems for water purification system
 - Demineralized water system and chemical feed areas – water treatment systems necessary to produce highly purified feedwater for the HRSGs; antiscalant and biocide storage and injection for the cooling tower
 - Water storage tanks – storage for filtered water and demineralized water
 - Ammonia unloading and storage area – tanks and unloading area for aqueous ammonia used for air pollution control
- Wastewater Systems
 - Secondary containment sumps (indoors) – contains liquids within material storage areas
 - Building and area sumps – collects washwater for treatment
 - Neutralization tank – adjusts pH to within acceptable range
 - Oil/water separator – removes oil from wastewater prior to discharge

- Connection to River Road force main - for sanitary and contaminated wastewater discharge
- Discharge of clean cooling tower and boiler blowdown wastewater
- Electrical Switchyard
 - Transformers – steps up voltage from turbine generators to 345 kilovolts (kV)
 - Switchyard electrical control house – controls switchyard equipment that controls flow of electricity from and to the Project
- Staff Facilities
 - Warehouse/maintenance building – spare parts storage and machine shop
 - Administration/control room building – staff offices and plant control systems

The heart of the combined cycle generation process are the Project's two CTs and one steam turbine. Each turbine is attached to a generator and step-up transformer. The CTs are fueled primarily by natural gas. Air is drawn into the unit, compressed, and then feeds the combustion chamber and mixed with pipeline quality natural gas and combusted. The combustion chambers feature dry low NO_x (DLN) combustors to reduce formation of nitrogen oxides. The expanded exhaust gas then passes through a 3-stage turbine, which powers both the compressor and the attached generator.

Waste heat from each CT is routed to a HRSG. The HRSG has multiple pressure zones to maximize the recovery of waste heat to generate steam. While in the HRSG, the exhaust gas passes through an oxidation catalyst and through the selective catalytic reduction (SCR) system to reduce air emissions. Exhaust gases are then vented to the atmosphere through stacks expected to be about 200 feet tall.

Steam generated in the HRSG is routed to the steam turbine to generate additional electricity. At the outlet of the steam turbine, the remaining low-pressure steam is routed through a condenser, where it is cooled and condensed to be recycled within the closed loop steam cycle. The condenser is cooled with water circulating through the cooling tower where the waste heat is rejected to air passing through the cooling tower through the cooling of evaporation and heat transfer.

2.3.4 Air Emission Control

The Project will be one of the most efficient and cleanest combined-cycle power plants in the world. The facility will be designed to meet lowest achievable emission rate (LAER) and best available control technology (BACT) standards, as applicable, for emissions control. Emissions of sulfur dioxide (SO₂) will be limited by using natural gas as the primary fuel. Emissions of particulate matter (PM), carbon monoxide (CO), and volatile organic compounds (VOC) will be limited through use of sophisticated combustion controls. An oxidation catalyst to further control CO, and possibly some VOC, will be installed.

The GE 7FA combustion turbine is based on GE's latest, proven technology. The 7FA achieves superior NO_x emission levels as a result of its DLN sequential combustion system working in conjunction with SCR, a post combustion flue gas control. SCR is a commercially available, proven technology to remove NO_x from the exhaust gases in the HRSGs. The SCR process involves injecting ammonia into the flue gas stream and then passing the flue gas stream through a catalyst bed that converts NO_x to benign nitrogen (N₂) and oxygen (O₂) gases.

2.3.5 *Water and Wastewater*

The Project will make use of an evaporative cooling tower. Evaporative cooling towers have many advantages over alternative cooling systems including reduced noise, smaller footprint and increased efficiency particularly in hot weather. Evaporative cooling towers have two impacts that often result in the use of other cooling techniques. First, in cold humid weather they can result in substantial visible plumes of water vapor. The Project has addressed this concern by being the first plant in Connecticut to propose the use of active plume abatement (plume reheat) to enable the plant to keep the extent of visible plume under control. Second, evaporative cooling towers require a significant volume of water that can be hard to locate with acceptable environmental impacts. In this case, an available supply of water is assured from the tidal reaches of the Connecticut River.

The Project will require a maximum daily water supply of 4.5 mgd with a daily average of about 3.0 mgd. This compares with a low flow (7Q10) condition in the river of about 1,900 mgd. Therefore, the Project's use of water would have no discernable impact on the river. Water would be withdrawn through an infiltration well system so there would be no intake construction in the river and no intake effects on aquatic organisms.

The Project will have a process wastewater discharge of about 0.5-0.75 mgd. This water will be primarily from the cooling tower and contains the constituents in the water feeding the cooling tower (from the river) concentrated by the evaporation of water in the cooling tower. This water could be discharged back to the river. There would be no new pollutant loading in the river as the discharge would contain materials taken from the river. Alternatively this water could be discharged into the municipal sewer system.

The Project will use very little water for potable and sanitary purposes. Sanitary wastewater will be discharged to the municipal sewer.

2.3.6 *Utility Interconnections*

Two utility interconnection corridors are planned. The first will follow the driveway to the plant from River Road. Utilities along this corridor are expected to include potable water, sanitary sewer, telecommunications, and distribution level electricity. The second will run along the eastern edge of the site and will include high pressure gas, raw water, sanitary sewer, and an oil pipeline to be used when replenishing the backup oil supply.

2.3.6.1 Electrical Interconnections

The electrical interconnection for the Project is based on having the capability of exporting a nominal 520 MW on a continuous basis. Investigations at the site, and discussions between the development team and Northeast Utilities indicate that the best option for this connection is to tap the existing CL&P line that runs from the Scovill Rock substation to the Manchester substation. The tap would be made just southeast of the structure supporting the river crossing. The structure is located just east of the Project switchyard location. The tap would loop (sectionalize) the line and bring two new lines into the Project switchyard.

The line is expected to have sufficient capacity for the Project requirements. Informal discussions with Northeast Utilities indicate that connection of the Project into the 345 kV system should not present any load flow, fault duty, or stability problems. This will be confirmed by interconnection and load flow studies which will be required by the independent system operator (ISO-NE) and the utility.

2.3.7 Instrumentation and Controls

A sophisticated control system will be used to monitor and control the various plant processes. A central control room will be staffed at all times with operators maintaining full plant control. The control system will be programmed to automatically control and/or monitor plant functions and notify the operators of abnormal conditions. A continuous emissions monitoring system (CEMS) will be used to monitor exhaust stack emissions. Local control systems will be provided for equipment that is operated manually.

2.3.8 Solid and Hazardous Waste Generation and Disposal

The Project will generate relatively little solid waste, as well as small amounts of wastes that are classified as hazardous and subject to the Resource Conservation and Recovery Act of 1976 (RCRA).

Solid waste will be generated during Project operations. Office and other facility wastes will be recycled to the extent feasible. A private contractor will dispose of non-recyclable materials. Normal Project maintenance will generate small quantities of solid waste on a periodic basis. Depleted SCR and oxidation catalysts will be sent for reprocessing to the original manufacturer or to a licensed facility for recovery or disposal.

The Project will implement a pollution prevention and solid waste management program and evaluate recycling opportunities. Recycling will be encouraged and supported through the on-site placement of appropriate containers. Solid waste and debris that cannot be recycled, reused or salvaged, will be stored in on-site dumpsters or similar containers for off-site disposal.

Based on experience at facilities presently being constructed and operated, about 5 to 10 cubic yards of waste will be generated weekly during operation. Approximately 50 to 100 cubic yards will be generated weekly during construction. This is equivalent to approximately 400 cubic yards of solid waste per month for the short-term construction period, some of which will be

recycled. Solid waste generation during construction varies depending on the phase of construction.

Potentially hazardous wastes will be separated from normal waste through segregation of storage areas and proper labeling of containers. All hazardous waste will be removed from the site by licensed contractors in accordance with applicable regulatory requirements and disposed of at either local or regional approved facilities. During Project construction and pre-operational cleaning, some solvents and flushing materials may be used. Such materials will be provided by the construction contractor, and will be removed by the contractor for appropriate off-site management.

The Project will be a generator of hazardous waste, but not a hazardous waste treatment, storage and disposal facility and thus will not require a RCRA permit. To fall below the RCRA threshold, the Project will not exceed the quantities and/or timeframes allowed for satellite accumulation or temporary accumulation of hazardous waste. In addition, the Project will fulfill certain statutory and regulatory requirements as part of its hazardous waste management protocol, as outlined below.

- The Project will acquire a unique hazardous waste generator identification number issued by the USEPA.
- The Project will ensure that hazardous waste transporters servicing the Project have their own USEPA identification number prior to releasing hazardous wastes.
- Personnel will follow accurate record-keeping requirements as to the quantity and nature of hazardous wastes generated on-site, with Material Safety Data Sheets (MSDS).
- All hazardous waste will be transported under a cradle-to-grave system of manifests.
- Hazardous waste management includes careful labeling, placarding, and placement of containers to be readily identifiable.
- Appropriate containers will be used, along with secondary containment measures where applicable.

2.3.9 Chemical and Petroleum Storage and Handling

During the construction phase of the Project there will be potential requirements for on-site storage of various hazardous materials, waste lube oils, and other lubricants, in addition to the bulk storage of chemicals. During operations, a similar need will exist to store limited amounts of hazardous materials.

2.3.9.1 Chemical Storage Requirements

State-regulated chemicals include those stored in aboveground tanks of 185 gallons or more. A regulated facility must maintain a spill prevention report for preventing and responding to spills,

releases, and accidents at the facility. The Project will use the following required practices and technology or, if requested and approved during detailed design, equivalent technology.

- Aboveground tank design in compliance with applicable regulations and industry standards.
- Transfer protocols including continuous visual monitoring of transfers, with immediate steps to address any leaks; leak inspections both before and after chemical transfer has been initiated; a requirement that brakes, chock blocks and caution signs must be in place during transfer; a requirement to control and keep incompatible and ignitable substances at a distance; and flexible connections such as hoses.
- Five-year structural inspections – for aboveground tanks with a capacity of 10,000 gallons or more; and for all piping systems, a complete inspection of structural soundness and the absence of external or internal corrosion that may result in a release before the next inspection and re-certification.
- Annual comprehensive inspection – for aboveground tanks and their interconnecting piping systems, a comprehensive inspection that includes testing of cathodic corrosion protection systems, thorough visual inspections of all facilities (including secondary containment) for wear and tear, and inspection of emergency response equipment.
- Monthly leak detection inspection – testing of cathodic corrosion protection systems and release detection tests, similar to the protocol for underground tanks.
- Daily visual inspection – visual inspection of aboveground storage tank systems for spills and leaks each operating day. In addition, the operator will check to ensure that drain valves are closed if not in use and there are no unpermitted discharges of contaminated water or hazardous substances.

2.3.9.2 Petroleum Storage Requirements

The Project will have the capability of burning low sulfur distillate oil as backup fuel to ensure a reliable electricity supply. The Project will store about 950,000 gallons of distillate oil on site. This tank will be protected by a secondary containment capable of containing 110% of the capacity of the tank and will have an impermeable floor. The tank is expected to be supplied by an underground pipeline running to one of several sources of bulk oil. The pipeline will be designed and constructed in compliance with all applicable regulations and standards.

Other fuel oil storage at the Project will be small aboveground tanks associated with emergency diesel equipment: a backup diesel fire pump (to be operated in case power from the grid to the firewater pumping system is not available during a firefighting event) and an emergency diesel generator (which is designed to operate only in order to ensure safe shutdown of the plant in case power from the grid is not available; and during testing). Petroleum fuel oil storage will include secondary containment in the form of 110% containment for both the emergency diesel generator and the fire pump storage tanks.

- Tanks will be made of steel and, if sited on-ground, underlain by impermeable barriers, with a leak monitoring system and cathodic protection for the bottom of the tank or equivalent.
- Exterior surfaces of all new aboveground storage tanks will be protected by appropriate protective coatings.
- All new oil underground piping systems must be made of steel or iron that is cathodically protected, fiberglass reinforced plastic or equivalent.

2.3.9.3 *Project's Spill Prevention and Control Design*

Consistent with the state regulations described above, as well with federal regulations under the Oil Pollution Act of 1990, the Project will implement a spill prevention, control, and countermeasures (SPCC) plan, which will consist of the following design and operational components, describing each in greater detail. The SPCC Plan for the Project cannot be finalized until facility design is completed.

Outdoor Chemical Storage Tanks. Spill prevention and control measures will include containment around the ammonia, acid and caustic tanks. The dikes will be sized to contain 110% of the volume of the tank. A normally closed and locked drain valve will prevent rainwater from being released without proper observation and testing, as necessary.

Boiler Chemicals. Curbed enclosures will be provided for boiler feedwater treatment chemicals and water pretreatment chemicals which will be stored in their delivery containers.

Cooling Tower Water Treatment Chemicals. Various chemicals needed to control the cooling tower water chemistry (including descaling agents and biocides like sodium hypochlorite) will be stored in curbed enclosures near the cooling water circulation pumps.

Oil Reserves. Curbs will also be provided around the STG lube and hydraulic (EHC) oil mechanical package reservoirs to provide secondary containment.

Oil-Filled Transformers. Each oil-filled transformer will be located over a concrete sump. The sump will be filled with crushed stone so that in the event of a failure, oil released will be collected in the interstitial spaces in the crushed stone. Each sump will have a monitor to check the level of liquid in the containment. Rain water that accumulates in the sump will be periodically pumped out and trucked off site with sufficient frequency so as not to compromise the sump's function and the sump will be sized to contain the total oil volume of the transformer(s) plus 10 minutes of fire deluge system operation.

Liquid Fuels/Chemicals. Spill containment control measures will also include containment around liquid fuel tanks, fuel/oil transfer equipment, and chemical unloading areas.

2.3.10 Protection Systems

The Project will be designed, constructed and operated to ensure maximum safety for employees and the surrounding community. Design, construction and operation of equipment for the proposed Project will be in accordance with applicable federal, state, and local regulations, and will comply with the latest regulations and standards of applicable governmental agencies and engineering associations. These organizations include the National Electrical Manufacturing Association, Department of Transportation, the American Society of Mechanical Engineers, the American National Standards Institute, and the National Fire Protection Association.

2.3.10.1 Fire Protection Water Supply and Routing

NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Converter Stations* is a recommended practice that has become the standard for power plant design. Insurers will require that the Project complies with NFPA 850. Fire prevention and protection for the facility, including all drawings, calculations, and related system details, will be reviewed and must receive approval from the local Fire Marshall and the Project's insurance representative.

Automatic and manual fire protection systems employing detection and extinguishing equipment will be provided at all locations having potential fire hazards due to the presence of combustible materials or where major property damage could result. Yard hydrants, interior fire hose stations (with 1-inch diameter hose), and portable extinguishers will provide additional incipient fire extinguishing capability and overall protection throughout the plant site. The fire protection water supply will be from the raw water storage tank via a centrifugal electric driven fire pump. A second fire pump will be diesel driven and also draw water from the fire/service water tank. The tank will be designed with a standpipe to reserve water for fire protection water supply in accordance with NFPA 13 standards. The main underground fire header will serve strategically placed yard hydrants and supply water to fire sprinkler/spray systems for plant equipment and structures. Each fire pump will supply maximum water demand for any automatic sprinkler system plus water for fire hydrants and hose stations.

A jockey pump will maintain water pressure in the fire water distribution headers. During fire conditions, the primary (electric driven) fire pump will start automatically when pressure in the firewater distribution header drops below the predetermined set point. If the system header pressure drops below the second set point, or in the event of an electric power failure, the back-up full-flow diesel driven fire water pump will start. Once started, the diesel pump will continue to run until stopped manually. Discharge from the pump will be connected to the underground yard loop. The fire pumps will be installed in accordance with NFPA 20.

The water supply for the permanent fire protection installation will be based on the largest fixed suppression system demand plus 500 gpm for hose stream demand for a 2-hour duration, required by NFPA 850.

First aid kits, eyewash stations, and safety showers will be provided at appropriate Project locations. In addition, a personal protective equipment program will be implemented for employees, contractors and visitors to minimize occupational hazards.

The Project will work with local and regional emergency service providers to ensure contingency plans are in place to respond to any emergency situation.

2.4 Project Construction

Construction at the Project site is expected to commence in 2003, with peak construction occurring in 2004. The peak construction work force on-site is estimated to be about 500 to 550 workers per day. The construction schedule is 24 months.

The construction sequence proceeds in a series of overlapping phases. It begins with site preparation. This will include clearing, grubbing, and grading of the site and access road. Site preparation also includes excavation of the storm water detention and infiltration basins, and formation of drainage swales if required. These tasks will be conducted early in the construction schedule. The offsite laydown areas along the access road will also be cleared and prepared.

As site preparation progresses, the delivery and installation of temporary buildings to house offices and worker lockers occurs. An on-site area will be set aside for temporary laydown and storage of facility materials and equipment. A gravel parking area will be constructed to serve workers and park construction vehicles when not in use. Temporary electric and phone utilities will be installed.

The next major step in the construction sequence will be excavation and compaction for foundations for the plant buildings, and excavation for and placement/backfilling of underground pipes and conduits. Excavated materials will be stored on-site and reused as fill and topsoil material in final grading to the extent possible.

Immediately following excavation, the building foundations will be formed, rebar and conduit will be installed, and concrete will be placed. At this juncture, approximately six months of the construction period will have elapsed. During this period, an intense level of site activity is anticipated. Since this could occur during summer months, dust from construction activities will be controlled by measures such as wetting of exposed soils on a regular basis and stabilizing storage piles by wetting and/or seeding. These measures will be implemented as standard practice for the construction effort.

Following site preparation and installation of foundations, erection of structural steel will begin. Concurrently, major equipment – the CTs, steam turbine, generators and HRSGs – will be delivered, assembled and set in place. Field-erected tanks and vessels will be constructed. Then the labor-intensive process of installing a complex array of interconnecting piping, electrical and instrument wiring and ductwork will begin. This is when the peak labor force will be required.

As the erection of building walls, finish work and final connections of piping and wiring is nearing completion, the process of checking the electrical and control systems, starting up major equipment, cleaning pipelines, and testing all systems will begin.

The culmination of Project construction will be the firing and initial synchronization of the CTs and generators, followed by the production of steam, free blow of steam lines, and initial synchronization of the steam turbine. Simultaneously, the water circulation pumps to the cooling towers will be tested. Finally, integrated combined-cycle operation will commence, and enter a rigorous test and shakedown period. The Project will then enter commercial service.

2.5 Project Operation

The Project will be designed to operate continuously (24 hours per day, 7 days per week) to provide baseload power. The operational labor force will consist of approximately 25 to 30 full-time employees, with about half working the normal day shift. The remaining employees will perform shift work to maintain 24 hour operation.

Plant workers will be trained and qualified in accordance with industry standards and state requirements. Project personnel will be trained in the areas of environmental compliance, safety and emergency response. The Project will also train local fire and police in the layout and operation of the plant, including safety systems, to facilitate local emergency response.

3.0 PROJECT NEED AND PUBLIC BENEFITS

3.1 Regulatory Context

An electric generating facility, a substation and electric and gas transmission lines are all statutory "facilities," the siting of which rests principally with the Connecticut Siting Council ("CSC"). The CSC has "exclusive jurisdiction over the location and type of facilities" subject to the provisions of Conn. Gen. Stat. § 16-50x(d). See Conn. Gen. Stat. § 16-50x(a).

Section 16-50x(d) allows a zoning commission and an inland wetlands commission to "regulate and restrict the location" of an electric generating facility and a substation subject to review by the CSC. Electric and gas transmission lines associated with this project are regulated solely by the CSC.

When exercising its power to regulate and restrict the location of the electric generating facility and substation, the local commission acts as a "special agency of the state" and must "weigh the considerations of public convenience, necessity and safety that may argue for approval against the considerations of public zoning [or inland wetlands regulations]...." Jennings v. Connecticut Light & Power Co., 140 Conn. 650, 659 (1954). The commission must utilize a "combination of standards of public convenience and necessity and those of public health, safety and welfare and the stabilization of property values." Id. An application may be approved even though it does not satisfy local requirements. Preston v. Connecticut Siting Council, 20 Conn. App. 474, 484 (1990), certif. denied, 214 Conn. 803.

The commission may issue orders that are necessary to the exercise of its power to regulate and restrict location, and such orders may be made within sixty-five (65) days of the date an application is filed with the CSC (in the case of the electric generating facility) and thirty (30) days of the date an application is filed with the CSC (in the case of the substation). Because it is usually preferable to have local review completed before an application is filed with the CSC, the applicant is filing this application with the commission well in advance of its CSC application. The applicant therefore requests that the commission issue any orders to regulate and restrict location within sixty-five (65) days of the date this application is filed (the review period for both the electric generating facility and the substation will run concurrently and will be sixty-five (65) days).

3.2 Public Benefit of the Project

The statutes governing the CSC review of this project require that the CSC find that there is a "public benefit" for the Project. A "public benefit" exists if the Project "is necessary for the reliability of the electric power supply of the state or for a competitive market for electricity." Conn. Gen. Stat. § 16-50p(c)(1).

The Project furthers the public policies of the State of Connecticut regarding electric competition, reliability and displacement of older, more polluting generation. As stated in Conn. Gen. Stat. § 16-244: state regulations should encourage and allow for a sufficient number of in-state generating facilities to ensure an adequate and reliable power supply and to ensure the

development of a truly competitive generation market; competitive market forces can result in a reduction in electric rates in Connecticut; reliable and affordable electricity is the key to the continuing economic growth of Connecticut and the general welfare of its citizens.

The Project also advances state energy policies set forth in Conn. Gen. Stat. § 16a-35k. These include consuming energy efficiently; diversifying the state's fuel mix; and utilizing energy sources less vulnerable to interruption due to circumstances beyond the state's control.

This project will provide clean energy from natural gas utilizing efficient combined cycle technology. For reliability purposes it will be able to utilize oil should natural gas supplies not be readily available. The Project is located adjacent to electric transmission lines and gas pipelines.

The Project owners believe that due to efficiencies they will be able to effectively compete in the marketplace, providing electricity at a cost below that of their competitors. Lower cost electricity will help drive down the cost of energy for consumers.

The Project is also well positioned to enhance system reliability by providing electricity to areas of Connecticut which lack generation, such as the southwestern portion of the state. The Connecticut Light & Power Company has announced plans to construct a transmission line from Middletown to Norwalk to help meet this need. The proposed transmission line runs near the site of the Project.

The CSC issued a draft "Review of the Connecticut Electric Utilities 2001 Twenty-Year Forecasts of Loads and Resources" in October, 2001. The CSC made the following findings which support this application:

- "Reliability has become a key issue to facility operation due to the age of many Connecticut generating plants." In this regard, "57 percent of the state's electric capacity is 25 years old or older."
- "Connecticut currently has 46 oil-fired electric generating facilities, some of which can also burn natural gas, contributing a total of 2,706 MW, approximately 45 percent of the state's current capacity.... Approximately 60 percent of the United States' oil is imported, making it potentially vulnerable to market manipulation by foreign nations."
- "Natural gas is expected to be the fuel of choice to be used for electric generation to meet sulfur dioxide standards and other limitations set by the [Clean Air Act]. Natural gas electric generating facilities are currently preferred primarily because of the available technology, high efficiency, cleaner emissions, and the relatively low capital cost per kwh produced.... [N]atural gas capacity entering New England has increased by more than 50 percent during the 1990s, much of this from Canada."
- "Generally, it is prudent to locate generation assets near load centers because of efficiency of transmission."

New clean, efficient electric energy from the Project will likely displace older, more polluting power plants, providing important economic and environmental benefits for Connecticut. Moreover, additional entrants into the energy marketplace will help to disperse market power, an important benefit as more power plants in Connecticut come under common ownership. The Project is well sited and is adjacent to needed infrastructure. Its location will allow it to meet regional needs, providing electricity system benefits throughout Connecticut.

The Project owners will restore a heavily disturbed site and install stormwater management systems to alleviate serious erosion problems which now impact nearby roads and the Connecticut River.

4.0 ENVIRONMENTAL SETTING, POTENTIAL IMPACTS AND MITIGATION MEASURES

This section describes the environmental context, both natural and man-made, in which the proposed project is located. For each environmental consideration probable environmental impacts are assessed.

4.1 Land Use and Zoning

This section describes the existing land uses and zoning of the Kleen Energy proposed project site and surrounding areas. Potential land use impacts relating to the operation of the proposed project are also discussed in this section. Information was obtained from the City of Middletown Zoning Code and map, site field surveys, and existing published sources. The existing conditions are defined for the proposed project site and immediate surrounding areas, as well as for land within a one-mile radius of the site. The area evaluated was one mile or less due to the limited zone of potential impact associated with the proposed project.

4.1.1 Land Use

A. Existing Land Use

Proposed Site and Contiguous Areas:

The proposed Kleen Energy project site is located in the Maromas section of the City of Middletown, Middlesex County, Connecticut. The Project site is located in an I-3, Special Industrial District. The proposed Project location is entirely within the Armetta and Associates property, and is located in the northeast portion. This property has long been subject to industrial use. Prior to Armetta and Associates purchasing the property, it was owned by Feldspar Corporation, who extensively mined the Project site for feldspar from the 1950s or before through the early 1990s.

The majority of the Project site has been disturbed and is underlain by rock and remnants of extensive mining. Portions of the Project site are barren, overgrown with secondary revegetation typical of previously disturbed areas, or forested.

The property contiguous to the Project area on three sides is owned by Armetta and Associates. To the north of the proposed project site is River Road. North of River Road is Armetta and Associates property and a rail line which bisects Armetta and Associates property, beyond which lies the Connecticut River. Three residences are on River Road northwest of the site. To the west of the area to be developed is a substantial area of vacant land owned by Armetta and Associates. At the far western edge of the Armetta and Associates property, it abuts residentially zoned land (R45) that is largely vacant. The zone boundary is over 2500 feet from the Project area. Land east of the Project site is owned by Connecticut Light and Power (CL&P), and includes an overhead 345 kV transmission line. The southern side of the site is bordered by Bow Lane, and a woods road that extends from the end of Bow Lane.

B. Land Use Impacts, Consistency with Local Land Use Plans

Proposed Site and Contiguous Areas:

The proposed use will be compatible with the previous industrial land use of the site. The proposed project site will be developed with two new CT generators operating in combined cycle mode to produce electricity. Overhead 345 kV transmission facilities already exist east of the Project site. The proposed facility will alter the existing land use of the proposed site from "abandoned" to "active" industrial use, and is consistent with the historic land use of the property. As the proposed project site was historically used for industrial purposes, approximately 100 years of feldspar mining, the proposed project will be consistent with the historical use of the property as well as the zoning, I-3 Special Industrial.

Area within One-mile Radius:

The land use patterns in the one-mile proposed project study area will not be adversely affected by the development of the proposed facility. Much of the developed land within the one-mile study area is state and industrial/commercial uses. The majority of residential uses to the southwest and northeast within a mile from the site are well buffered from the proposed project site by intervening wooded terrain. As the proposed project site was historically used for industrial purposes, the construction and operation of the proposed facility will not greatly impact the residences along the river bluff in Portland. As such, no adverse impacts to the existing land use patterns within the proposed project area will result from construction and operation of the Kleen Energy project.

Consistency with Plan of Development

The City of Middletown's Plan of Development (Plan) is currently being revised. The revised Plan under consideration and current planning mapping calls for the area to be used for industrial development. The Project is consistent with this goal. Earlier plans, while recognizing that the area was (then) being mined, suggested that after reclamation the area could be used for residential use. However, in light of the condition of the site after mining was completed and the site abandoned, it would be infeasible for the area to be used for residential use. Residential use could never support the cost of the civil works needed for the site to be graded such that it could be prudently and safely used for residential purposes.

C. Conclusions

The Kleen Energy Generating Facility project site is proposed to be located along the eastern edge of the Armetta and Associates Property. As a result, the Armetta and Associates property acts as a buffer zone for the Project and helps to minimize impacts to surrounding land uses. The use of the 137 acre parcel for electric generation purposes is consistent with historic land use.

4.1.2 Zoning

A. Overview

The City of Middletown Zoning Code ("Zoning Code") and Zoning map regulates land uses in the municipality where the Project site is located. In addition to land use controls, the Zoning Code also sets minimum lot size; building areas, heights and setbacks; parking requirements and sign restrictions.

Kleen Energy is undertaking this proposed project to provide reliable, economic energy to the New England grid to meet the public need for additional clean, efficient energy generation. In conjunction with this undertaking, Kleen Energy has determined that the proposed project is consistent with the City of Middletown's Zoning Code.

B. City Zoning Code

The Project site, wholly within the City of Middletown, is located within an I-3, Special Industrial Area (see Figure 4.1-1). Under the Zoning Code, lots in I-3 Districts are required to be a minimum of 217,800 square feet (5.0 acres) and are restricted to agriculture, laboratories, manufacturing, printing and related trades, and public utilities buildings and structures and its accessory uses. With special exception the following uses may also be allowed in an I-3 District: junkyards and buildings material salvage yards, natural resource extraction, bus stop passenger shelters, adaptive historic preservation use harmonious with the physical characteristics and originally designed use of the structure, child care facilities, and solid waste facilities. The proposed project location conforms to the existing I-3 zoning.

Section 15, Performance Standards:

Section 15 of the City of Middletown Zoning Code states:

No land or structures in any zone shall be used or occupied in any manner so as to create any dangerous, injurious, noxious, or otherwise objectionable fire, explosive, or other hazard; noise or vibration, smoke, dust, odor or other form of air pollution, heat, cold, dampness, electrical or other substance, condition or element; in such a manner or in such quantities and of such characteristics and duration as to be, or likely to be, injurious to public welfare, to the health of human, plant or animal life or to property in the adjoining premises or surrounding area (referred to herein as "dangerous or objectionable elements") provided that any use permitted or not prohibited by this Code may be established and maintained provided it conforms to the provisions of this section.

The construction and operation of the Project will be regulated by the Connecticut Siting Council and the Connecticut Department of Environmental Protection. Notwithstanding, the Project will be in compliance with the City of Middletown performance standards. The Project will not be injurious or threaten the public welfare, the health of human, plant or animal life or to property in the adjoining premises or surrounding area.

Area within One-mile Radius:

The land uses within one mile of the site are primarily state land or undeveloped vacant land with limited residential uses.

Land uses to the north of the site within one-mile radius consist of the Connecticut River, vacant land (owned by Armetta and Associates) and a rail line in the City of Middletown. Across the Connecticut River in the Town of Portland land uses within the one-mile radius include, undeveloped vacant land zoned Flood Plain (FP), with some commercial and residential areas (RR and R15). The Connecticut River represents the municipal boundary between the City of Middletown and the Town of Portland. Land north and northwest of the river is vacant land zoned Flood Plain. This vacant land includes marshland and a 300-foot ridge, along the top of which runs a utility right-of-way. North and northeast of the river, the land use is primarily residential and commercial. Businesses line Portland-Cobalt Road, with residential communities mainly located on side streets. Some of the businesses along Portland-Cobalt Road include Portland Power Equipment, Little Acorn Day Care Center, Woodings Farm and Greenhouses, Mo's Restaurant, Riverdale Motel, and Axelrod Tire and Service. North of Portland-Cobalt Road is Jobs Pond, which is lined with residences, and Middle Haddam Road, a residential street. The main residential community south of Portland-Cobalt Road is off of Payne Boulevard. This neighborhood resides atop a 150-foot bluff above the Connecticut River.

Land east of the Armetta and Associates property is owned by CL&P, and is undeveloped with the exception of a few utility right-of-ways. Further east is the industrial site of the NRG Middletown Station Power Plant, which is located between the rail line and the Connecticut River.

Land to the south of the Armetta and Associates property is mainly undeveloped state land with limited residential uses. Much of the state land belongs to the Connecticut Valley Hospital, which is managed by the State of Connecticut Department of Mental Health and Addiction Services. The majority of this hospital land is undeveloped, and includes three reservoirs utilized by the Hospital. Cockaponset State Forest is also located within a mile to the south. Residences are limited along Cedar Lane, Reservoir Road and Bow Lane southwest of the proposed site.

Land within $\frac{1}{4}$ mile to the west of the Project location is owned by Armetta and Associates. The land beyond is mainly undeveloped state land with limited residential and commercial uses. Approximately $\frac{3}{4}$ mile west of the proposed site is the Riverview Hospital for Children and Youth. Within the one-mile radius to the west is the WMRD radio station and tower. South of the radio station along Silvermine Road is the Connecticut Valley Hospital cemetery. Bow Lane, which runs east-west and dead ends approximately $\frac{1}{4}$ mile southwest from the Project site, supports limited residential uses west of the site.

AQUIFER

TOWN OF PORTLAND

RIVER

CONN. RIVER AQUIFER
P&W SITE

← SITE

R-30

R-45

I-3

C.V.N.
Res. No. 1

C.V.N.
Res. No. 2

HUBBARD
POND

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
(978) 970-5600

KLEEN ENERGY SYSTEMS, LLC
MIDDLETOWN, CONNECTICUT

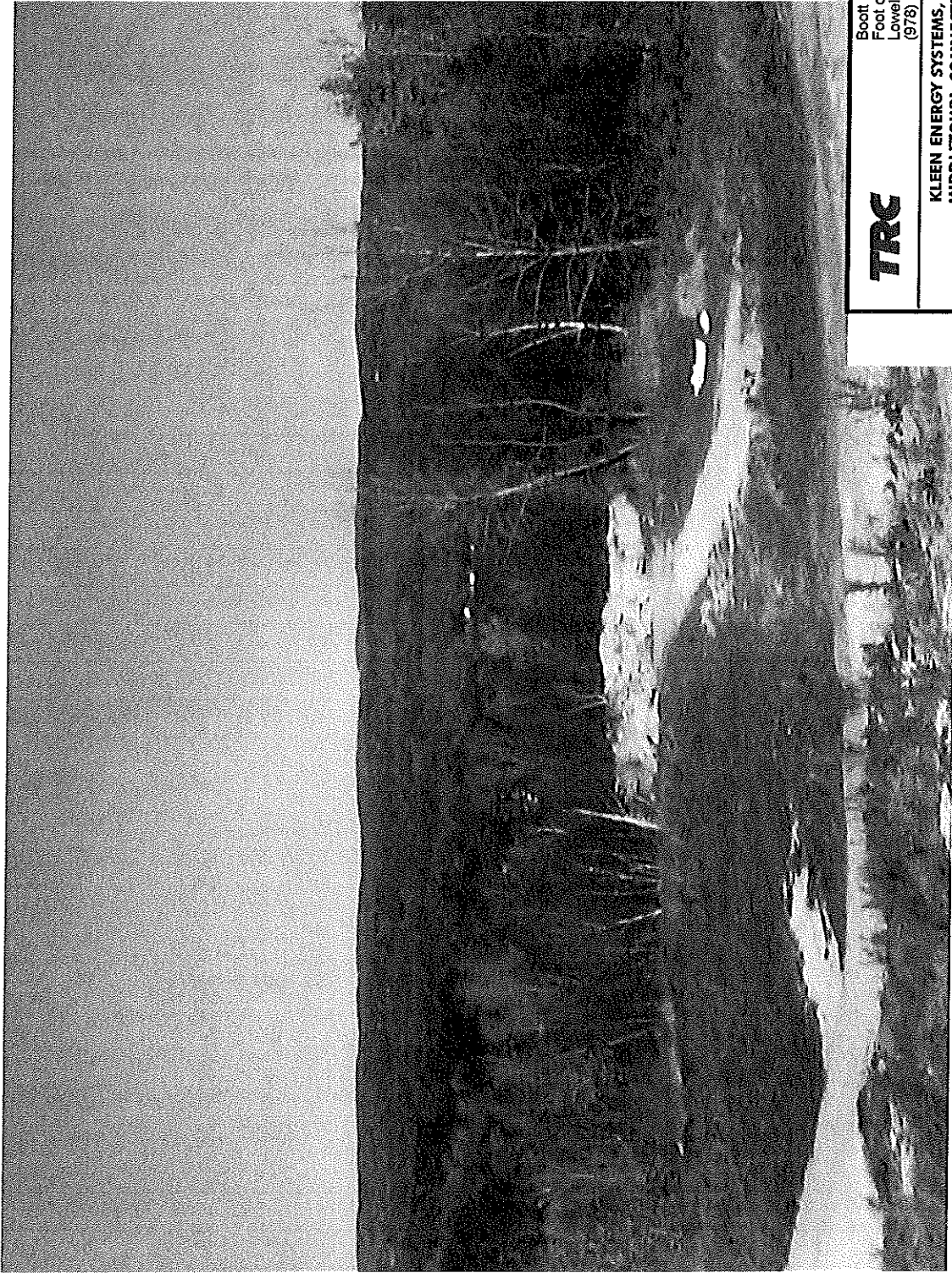
FIGURE 4.1-1
Middletown Zoning Map

Date: 11/01

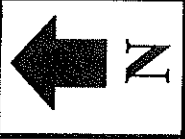
Project No. 33876



33876 ZONE



TRC		Boat Mills South Foot of John Street Lowell, MA 01852 (978) 970-5600
KLEEN ENERGY SYSTEMS, LLC MIDDLETOWN, CONNECTICUT		
FIGURE 4.3-1 Project Site Looking Northeast		
Date: 11/01	Project No. 33876	



33876\\cad\\kleenusgs

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
(978) 970-5600

KLEEN ENERGY SYSTEMS, LLC
MIDDLETOWN, CONNECTICUT

FIGURE 4.3-2
Project Site Looking West

Date: 11/01 Project No. 33876

Section 37, I-3 Special Industrial Zone:

Under Section 37 of the Zoning Code, the following standards and dimensional regulations apply to a project to be sited in an I-3, Special Industrial District. The Project as proposed complies with the majority of these regulations.

Minimum Lot Area: The minimum lot area within the I-3 Special Industrial District is 217,800 square feet or 5.0 acres (43,560 square feet = 1 acre).

The proposed project complies with this requirement because the facility will be located on an approximately 137 acre parcel which is greater than the minimum lot areas set forth above.

Minimum Front Yard Setback: There is no minimum front yard requirement in the I-3 district.

Minimum Rear Yard Setback: In the I-3 Special Industrial District there is no rear yard requirement.

Minimum Side Yard Setback: In the Special Industrial District, there is a minimum requirement of 20 feet on the side yard.

The proposed project complies with this requirement because the facility structures will have setbacks more than 150 feet on all sides of the developed area. These setbacks are greater than the 20 foot requirements set forth above.

Maximum Lot Coverage (inclusive of accessory buildings): Each main building or structure erected, together with its accessory buildings or structures, shall not cover more than thirty (30) percent of the net lot area. (Zoning Code 37.04)

The proposed project complies with this requirement because the facility and all accessory buildings will cover less than 7 acres, less than 5 % of the total 137 acre project site.

Maximum Height: In the I-3 Special Industrial District, the maximum height shall not exceed one hundred and fifty (150) feet, except as provided in Section 13.02 (Height Modifications). Zoning Code Section 13.02.04 discusses structures to which height limitations do not apply. Included in this section are flues.

The proposed facility will have stacks that exceed the 150 feet requirement. The Project stack will be approximately 200 feet above grade. The stack will be within the exception set out in section 13.02.04. The other main buildings associated with the Project will have heights less than 150 feet above grade.

Off-Street Parking and Off-Street Loading Requirements: The City of Middletown Zoning Code requires off-street parking and off-street loading in I-3 Districts. I-3 off-street parking and off-street loading requirements are outlined in Section 40 of the Zoning Code.

The proposed facility will comply with all off-street parking and off-street loading requirements with the exception of Section 40.04, Quantity of parking spaces. The zoning code requires one (1) parking space for each two (2) employees plus additional parking for customers. It also states that no use in this category shall have less than three (3) spaces or less than one (1) space for every 500 sq. ft of gross building area. If the Project were to have to comply with this requirement over 160 parking spaces would be required. The Project proposes a total of 24 spaces. Twenty four spaces allow one parking space per employee at peak shift (16 employees) and 8 spaces for guests.

Section 48, Sign Regulations:

The City of Middletown has established signage regulations and standards. Section 48 of the Zoning Code outlines these requirements.

The Project will comply with all signage regulations and standards specified in Section 48 of the City of Middletown, Zoning Code.

E. Conclusion

The proposed project has been designed with careful consideration of local ordinances. As a result, the Project as proposed, and to the extent feasible, is in substantial compliance with the City of Middletown Zoning Code. As noted above, this project is also consistent with surrounding land use. Additionally, the construction and operation of the Project will be regulated by the Connecticut Siting Council and Connecticut Department of Environmental Protection.

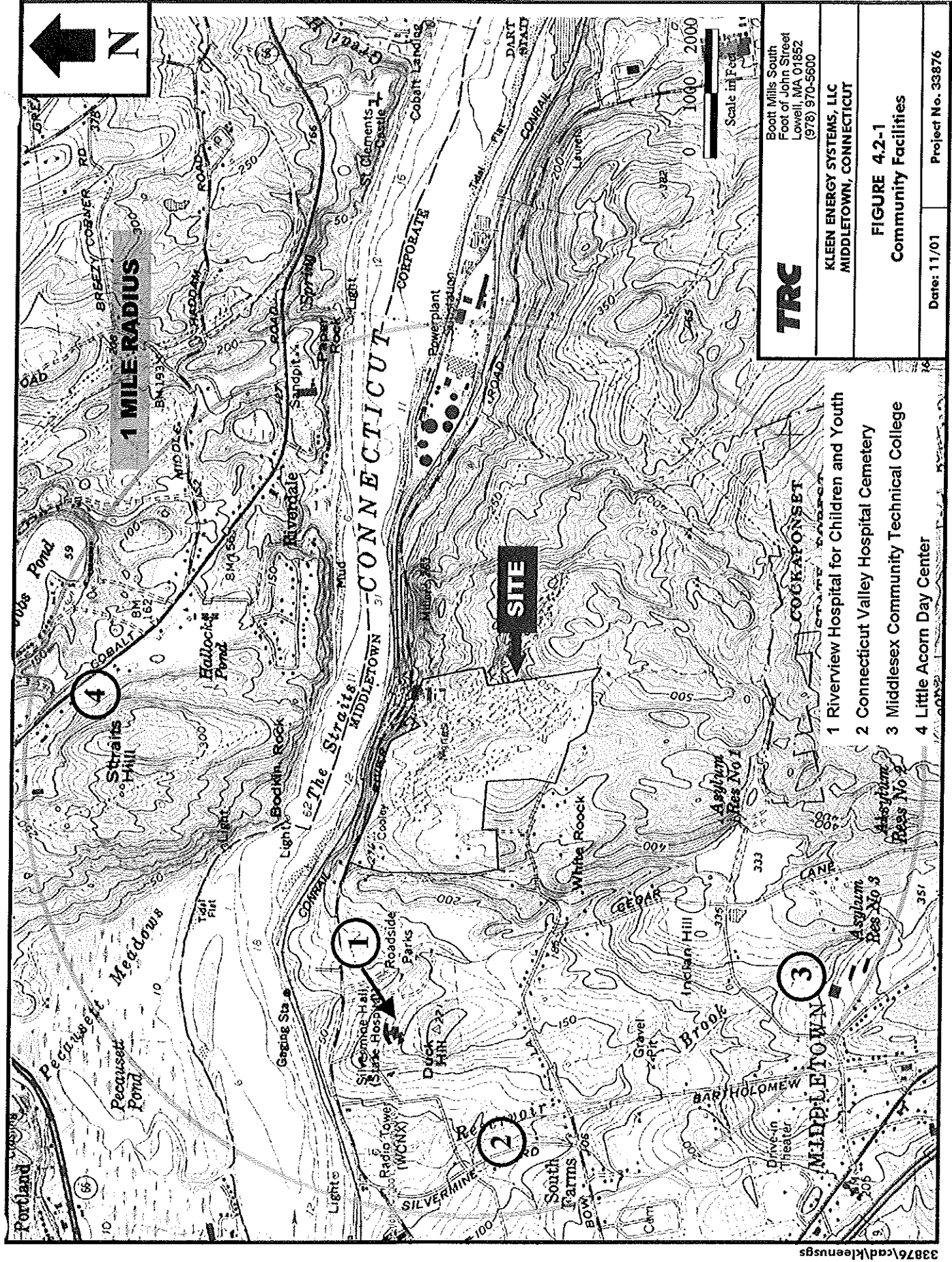
4.2 Community Facilities and Recreational Resources

An inventory of community facilities (schools, hospitals, government offices, religious facilities, etc.) has been taken within a one-mile radius of the Project site to assess the potential impacts, if any, of the proposed project on these facilities. Four community facilities are located within a one-mile radius of the site (Figure 4.2-1).

4.2.1 Community Facilities and Recreational Facilities Inventory

Community and recreational facilities within a one mile radius of the proposed site are presented below:

- **Riverview Hospital for Children and Youth.** The Riverview Hospital for Children and Youth is a State of Connecticut facility, and is located on River Road approximately ¾ mile west of the proposed site in Middletown.
- **Connecticut Valley Hospital Cemetery.** The Connecticut Valley Hospital Cemetery is part of a State of Connecticut mental health and addiction facility, and is located just under one mile to the west of the proposed site on Silvermine Road in Middletown.



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- **Middlesex Community Technical College.** The Middlesex Community Technical College is located on Training Hill Road just beyond the one mile radius southwest of the proposed site in Middletown.
- **Little Acorn Day Care Center.** The Little Acorn Day Care Center is located approximately ¾ mile north of the proposed site on Portland-Cobalt Road in Portland.

4.2.2 Project Impacts on Community Facilities

The Kleen Energy Generating Facility is physically separated from the identified community facilities by Armetta and Associates property, intervening industrial and commercial land use development, and the Connecticut River. Because of this physical separation, the proposed facility will have no direct impact on identified community facilities located within the one-mile study area. The proposed facility construction and long term operation will also not result in any induced growth in demand on the community facilities.

With respect to indirect impacts on community facilities, the proposed facility's maximum modeled air quality concentrations will be below the U.S. EPA National Ambient Air Quality Standards (NAAQS). The cumulative modeled concentrations representing the generating facility's concentrations added to existing background air quality will also be below the NAAQS. As indicated in Section 4.8 of this document, no adverse impacts on community facilities are expected due to air quality considerations. The noise analysis in Section 4.4 indicates that compliance will be achieved with both Connecticut Department of Environmental Conservation and the City of Middletown noise standards. As indicated in Section 4.3, no adverse visual impacts on community facilities will occur.

The proposed facility will not have a significant impact on public safety services such as police and fire services. The proposed facility will not result in an increased need for police services, as it does not result in the addition of substantial population to the area and will not require access to a police station. The proposed project will coordinate directly with the City of Middletown Fire Department regarding emergency response capabilities. In addition, the proposed facility will have fire protection capabilities incorporated in the proposed project design.

Existing solid waste services in the Project area will also not be adversely impacted by operation of the proposed facility, as solid waste generated at the proposed project site while in operation is expected to be very limited. Approximately 25-30 employees will be permanently stationed at the proposed facility, and very little solid waste will be generated. A licensed contractor will handle the transport, storage, treatment and disposal of solid wastes associated with the operation of the facility. All solid waste generated will be disposed of at an approved facility. Oily wastes collected in the proposed facility's oil/water separator will be contained and hauled off-site for disposal by a licensed contractor. Therefore, the proposed facility will not place any significant burdens on either publicly or privately operated solid waste collection and disposal systems.

4.2.3 Conclusion

The Kleen Energy Generating Facility will have no direct or indirect impact on the identified community facilities. The proposed project would not place any significant additional demands on community facilities or City services.

4.3 Visual Resources

The following section characterizes the visual quality of surrounding communities, identifying specific visual resources within a 1-mile study area of the proposed project site, and evaluates the potential visual impact of the proposed facility on these resources. The potential visual impacts were assessed based on field visits to the Project site and study area in November 2001, and review of aerial photographs of the Project area.

4.3.1 Existing Environmental Setting

The proposed project site is located in the northeast corner of the Armetta and Associates property in the City of Middletown, Connecticut. The Project site is within the Armetta and Associates property and is bounded to the north by River Road. East of the property is undeveloped CL&P land with an overhead 345 kV transmission line and right-of-way. The Armetta and Associates property is bordered to the south and west by undeveloped state land, with Bow Lane along the southwest border. The Armetta and Associates property has been historically in industrial use, and surrounding areas include State facilities and vacant land. The nearest residential community begins about 600 feet north of the proposed site, with additional communities beginning about $\frac{1}{3}$ mile to the northeast and about $\frac{1}{4}$ mile to the southwest.

The proposed site is an old feldspar mine that was operated by Feldspar Corporation for over 44 years and was actively mined for a period of over 100 years. The terrain varies due to the extensive mining that occurred, and is underlain by rocks and mining tailings. Dirt roads which supported the mining operations wind throughout the site. Portions of the Project site are barren or overgrown with secondary revegetation typical of previously disturbed areas, while others are forested. (See Figures 4.3-1 and 4.3-2) Another residual of the mining operations are several quarry pits, some that make up wet pockets on the Project site.

The elevation of the site varies from approximately 200 to 400 feet above mean sea level (MSL), with quarry pockets dipping down to about 200 feet above MSL. The elevation of the surrounding area is greatly varied, with tidal flats and marshes along the river to the northwest and east, and 300-foot bluffs rising from the river north of the proposed site. Change in topography, as well as tall stands of deciduous and evergreen trees within the residential communities to the northeast and southwest of the proposed project site, limit the views of the proposed site from these locations.

4.3.2 Visual Resource Identification

A project site file search at the Connecticut Office of Parks Recreation and Historic Preservation (OPRHP) was undertaken to find records of sites listed or evaluated as eligible for the National Register of Historic Places (NRHP). As presented in Section 4.6, the file search concluded that there are no properties listed on the NRHP located within a one-mile radius of the Project area.

No State-designated recreation areas exist within the 1-mile study area, but there is a State forest located approximately ¼ mile to the south.

4.3.3 Potential Visual Impacts on the Project Area

The proposed project design will be compatible with nearby uses and developments, thereby minimizing visual impacts for the local community. Potential visual impacts of the proposed facility have been assessed for the surrounding communities near the one mile study area in the City of Middletown and the Town of Portland. Figure 4.3-3 shows locations of photographs taken for visual analysis. Three figures display views of the site from residential communities.

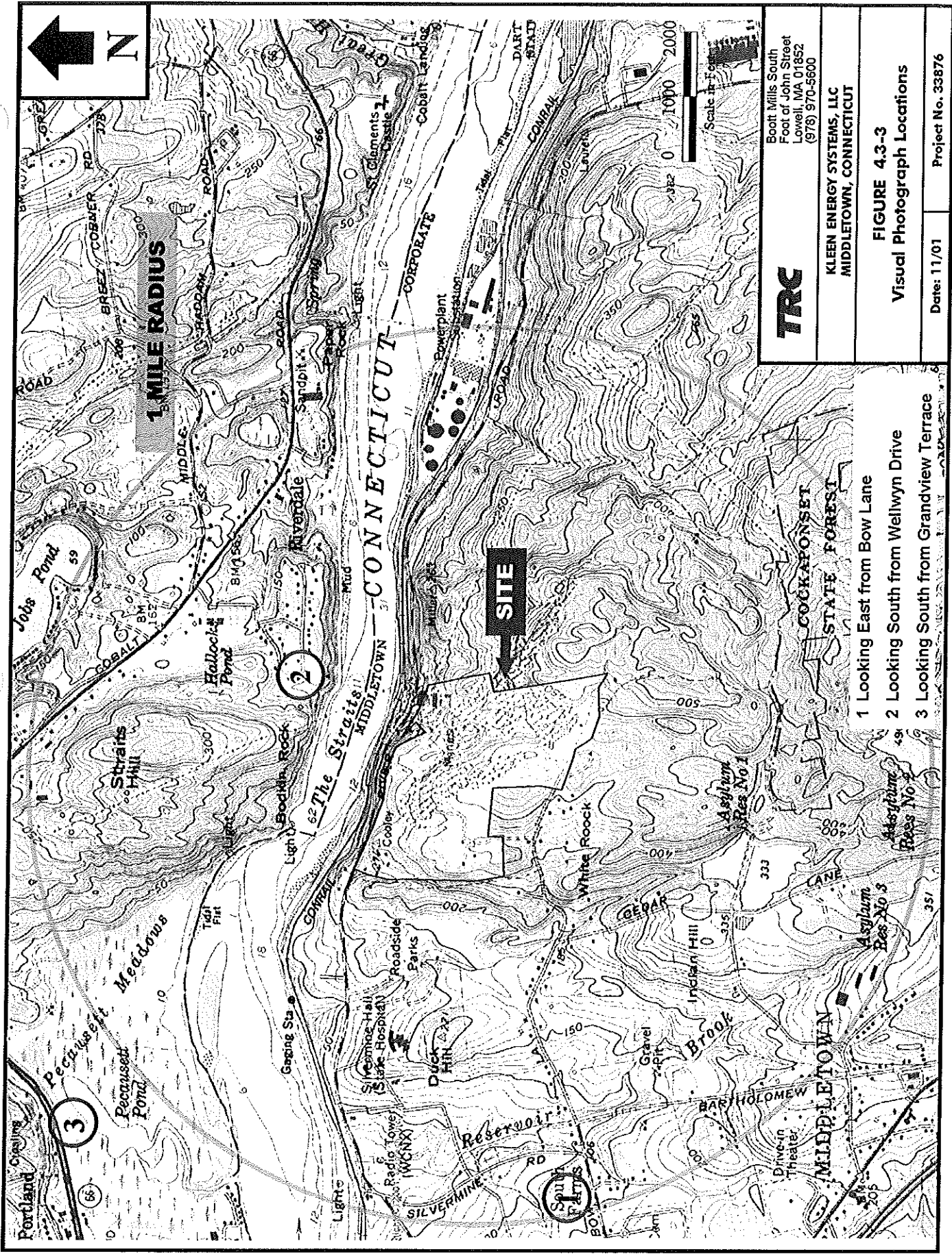
The three residences to the north of the proposed site reside along River Road, and are at an approximate elevation of 100 feet MSL. The change in elevation and the mature woodlands between these residences and the proposed site create a visual barrier between these homes and the proposed facility location.

Residential communities to the southwest are concentrated along Bow Lane, which dead ends approximately ¼ mile southwest of the proposed site. The combination of rolling topography and mature woodlands between the residences at the end of Bow Lane and the proposed site creates a visual barrier between these homes and the proposed facilities. Figure 4.3-4 is taken from a field along Bow Lane at approximately one mile from the site. The Project stacks, potentially the most visible feature on the Project site, would be difficult to see above the tree line. During winter conditions, the absence of leaves on the deciduous trees may increase the Project's visibility from intermittent viewpoints.

The Connecticut River is to the north of the site and is at sea level (i.e., tidal). Because the river lies at the bottom of a steep narrow gorge, the Project will be almost entirely obscured from view from the river. The tops of some of the towers in the substation may be visible, as are the towers supporting the existing transmission line crossing. Generally, views from the river should be affected minimally.

The Town of Portland is to the north of the Connecticut River. This area of Portland is characterized by marshlands and woodlands to the northwest, and residential and commercial uses along Portland-Cobalt Road to the northeast. The marshlands and woodlands to the northwest range in elevation from approximately 5 to 350 feet above MSL. Just beyond one mile of the proposed site to the northwest is a small residential community. These residences lie east of the Portland Boat Works along the riverbank at about 10 feet above MSL, and may have limited views of the stacks at the proposed site (Figure 4.3-5).

33876\\cad\\kleenusgs





TRC		Booth Mills South Foot of John Street Lowell, MA 01852 (978) 970-5600	
KLEEN ENERGY SYSTEMS, LLC		MIDDLETOWN, CONNECTICUT	
FIGURE 4.3-4		View Looking East from Bow Lane	
Date: 11/01		Project No. 33876	



TRC		Boott Mills South Foot of John Street Lowell, MA 01852 (978) 970-5600	
KLEEN ENERGY SYSTEMS, LLC		MIDDLETOWN, CONNECTICUT	
FIGURE 4.3-5 View Looking from Wellwyn Drive			
Date: 11/01		Project No. 33876	

Other views to the south from these residences include facilities of the Connecticut Valley Hospital, run by the State of Connecticut Department of Mental Health and Addiction Services. Hospital facilities within view consist of administration and residential buildings, as well as the stack of the Hospital's power plant.

Elevation of land in Portland within a mile of the site to the northeast ranges from about 50 feet to 150 feet above MSL. Portland-Cobalt Road is lined with businesses, with residential spurs to the north and south of the road. The closest residences are along Wellwyn Drive on the river bluff north of the site at 150 feet in elevation, and will have a potential to have a clear view of the proposed facility stacks. (Figure 4.3-6). Existing vegetation presently obscures the view to much of the site. Other views to the southeast from these residences include the buildings and stack of the NRG Power Plant, which is located on the riverbank in Middletown, about 1.1 miles east of the proposed site.

4.3.4 Conclusion

The proposed project will not adversely affect the existing visual character of the communities surrounding the proposed development site. The proposed site was previously used for industrial purposes as a feldspar mine, and the land immediately east is used for utility purposes with overhead transmission towers and lines in a utility right-of-way. Additionally, the site is situated within a location that offers existing screening that conceals the site from residences to the southwest, while limited views of the proposed facility's stacks would be afforded from some areas to the north and northeast. The proposed facility will ultimately be incorporated into a previous industrial setting, with additional industrial facilities further east, and consequently, will not result in a significant alteration of existing viewsheds in the proposed project area. Architectural renderings and simulations are located in Appendix A of this document.

4.4 Noise Analysis

4.4.1 Noise

As noted earlier, the Project has had a goal of maximizing the reuse of the previously mined areas of the Project site. This has led the Project to locate toward the eastern boundary of the site. This fortuitously has also maximized the distances of Project facilities from residential or other sensitive receptors. The cooling tower and power block (the likely sources of significant noise contribution) are over 600 feet from the boundary of the site that abuts a residential zone. The Project is much closer to the site's boundary to the east (CL&P), but this is still within the I-3 zone, which leads to much less restrictive noise level requirements.

The Project will also be located in a bowl shaped depression in the side of the hill rising from the river. This depression is a result of original natural contour, past mining activities, and excavation that will be needed to restore the mined area into a useable site. This depression will help to shield any Project noise to the south, east and west. Sensitive sources to the north, residences in Portland, while not benefiting from the noise blocking effects of interceding landforms, nonetheless will benefit from the width of the Connecticut River – the distance from the core of the Project to the residences in Portland exceeds 2500 feet.



TRC		Boatt Mills South Foot of John Street Lowell, MA 01852 (978) 970-5600	
		KLEEN ENERGY SYSTEMS, LLC MIDDLETOWN, CONNECTICUT	
		FIGURE 4.3-6 View Looking Southeast Toward Project Site	
Date: 11/01		Project No. 33876	

The Project is in the process of conducting an ambient noise survey in order to be able to characterize the existing noise environment. Once this is complete and preliminary engineering has advanced, the Project will present a comprehensive noise analysis in the Siting Council application. The noise analysis will include comprehensive noise modeling of the major facility sources, including the combustion turbines and exhaust, cooling towers, transformers, etc. The modeling will be used as a design tool in order to determine the degree of abatement or mitigation (if any) required on individual noise sources. Modeling runs will be made, with noise control added as required, until the required noise limitations are achieved.

Project noise levels will be limited by the State of Connecticut noise standard. The standard limits noise levels by land use. At residentially zoned areas, Project noise levels will be limited to 61 dBA during daytime hours and 51 dBA during nighttime hours. Since the facility noise levels will not vary by time of day, the Project will be designed to achieve the 51 dBA limit at residential zones. To the east, along the boundary with CL&P, which is industrially zoned, the Project will be limited to 70 dBA.

Because of the Project's siting and technology, it is expected that the Project will be able to meet these noise limitations with good design practices, enclosing of major equipment (turbines) and with minimal secondary abatement (e.g., noise walls).

4.5 Traffic Analysis

4.5.1 Existing Roadway Geometry

Field observations to determine the existing baseline traffic conditions in the vicinity of the proposed Project were conducted. A review will be performed of the traffic to be generated during both the construction and operation of the proposed 520 MW facility to verify that the Project will not have a significant impact on the traffic operating conditions of the adjacent roadway network.

The following are brief descriptions of the roadways in the vicinity of the proposed Kleen Energy Systems facility in Middletown, Connecticut:

- **Silver Street.** Silver Street is a two-lane roadway that runs in an east to west direction in the Town of Middletown. No shoulders are provided on either side of the roadway. A sidewalk is provided on the northern side of the street. Silver Street is under local jurisdiction and has a posted speed limit of 25 mph.
- **Eastern Drive.** Eastern Drive connects Bow Lane to the south (directly opposite the northbound Route 9 off-ramp) with River Road to the north. Eastern Drive is a one lane per direction roadway traveling in a north/south direction and does not provide shoulders or sidewalks on either side of the roadway. A sidewalk is provided on the western side of the street. Eastern Drive has a posted speed limit of 25 mph and is under local jurisdiction.

- **Route 9.** In the vicinity of the site, Route 9 is a two lane per direction roadway traveling in a north/south direction. Route 9 has a posted speed limit in the vicinity of the site of 45 mph. Route 9 is under the jurisdiction of the Connecticut Department of Transportation (CTDOT).
- **Silvermine Road.** Silvermine Road is an unpaved one lane per direction roadway traveling in a north/south direction from Bow Lane in the south to Silver Street in the north. Silvermine Road has a posted speed limit of 20 mph and is under local jurisdiction.
- **River Road.** River Road is a one lane per direction roadway traveling in an east/west direction. River Road has a posted speed limit of 25 to 30 mph. River Road is under local jurisdiction.

4.5.2 Site Access

Access to the site is to be provided via a driveway to be located along River Road to the east of Silver Street. The driveway will provide one entering lane and one exiting lane. The Kleen Energy Systems driveway approach to River Road will be under STOP control.

Vehicles arriving to the site will most likely travel along Route 9 to Silver Street (in the southbound direction) and to Eastern Drive at Bow Lane in the northbound direction.

After a thorough review of the arrival and departure distributions for the proposed Project, the following study locations were determined to be the key locations. Manual turning movement traffic counts were conducted at the following locations:

1. Silver Street and Southbound Route 9 Off-ramp
2. Silver Street and Eastern Drive
3. Eastern Drive and Northbound Route 9 On-Ramp
4. Eastern Drive/Northbound Route 9 Off-Ramp and Bow Lane
5. Silvermine Road and Silver Street/River Road

Figure 4.5-1 identifies the location of each of the roadways described above.

Manual turning movement traffic counts were conducted on Wednesday, November 7, 2001 from 2:30 PM to 6:30 PM and Thursday, November 8, 2001 from 6:30 AM to 9:30 AM at the above-mentioned locations. Automatic Traffic Recorder (ATR) counts were also performed to supplement the manual traffic counts.

Based upon the performed traffic counts, the Peak Highway Hours were determined to be as follows:

Peak AM Highway Hour: 7:30 to 8:30 AM

Peak PM Highway Hour: 2:45 – 3:45 PM

The early Peak PM Highway Hour is a result of the adjacent Hospital traffic. During these hours, the existing traffic along the roadways adjacent to the site is generally the highest of the day, and thus represents Design Hour conditions. The 2001 Existing Peak AM Hour and Peak PM Hour Traffic Volumes were balanced, where appropriate, to insure uniformity. The 2001 Existing Traffic Volumes are illustrated graphically on Figure 4.5-2. Additional traffic volumes, obtained from the Connecticut Department of Transportation are contained in Appendix B.

4.5.3 Trip Generation

The proposed Facility will not adversely impact existing traffic conditions on the adjacent roadways in the vicinity of the proposed development site. The proposed Facility will have a limited number of employees (maximum number on day shift is approximately 10-12) and generate a minimal number of vehicle trips. Therefore, based on observations of existing traffic volumes along the adjacent roadways, and the very small number of trips expected to be generated by the proposed Facility, even when staffed, traffic on local roadways will not increase significantly.

During construction of the proposed Facility, two categories of vehicular trips will encompass the construction activity: worker trips and equipment/supply deliveries. The first category, worker trips, are construction workers traveling to and from the job site. The maximum projected peak number of construction workers employed at any one time is projected to be approximately 500 to 550. This peak period is only for a few months and will not be during the entire construction period when construction traffic volumes will be significantly less than during the peak period. A portion of the construction workers will carpool.

Construction activities will tend to be scheduled to be offset from the peak roadway hours, if possible, thus minimizing its impact. As the construction period will only be temporary, vehicle trips associated with construction would not be likely to have any significant impact on local roadway conditions.

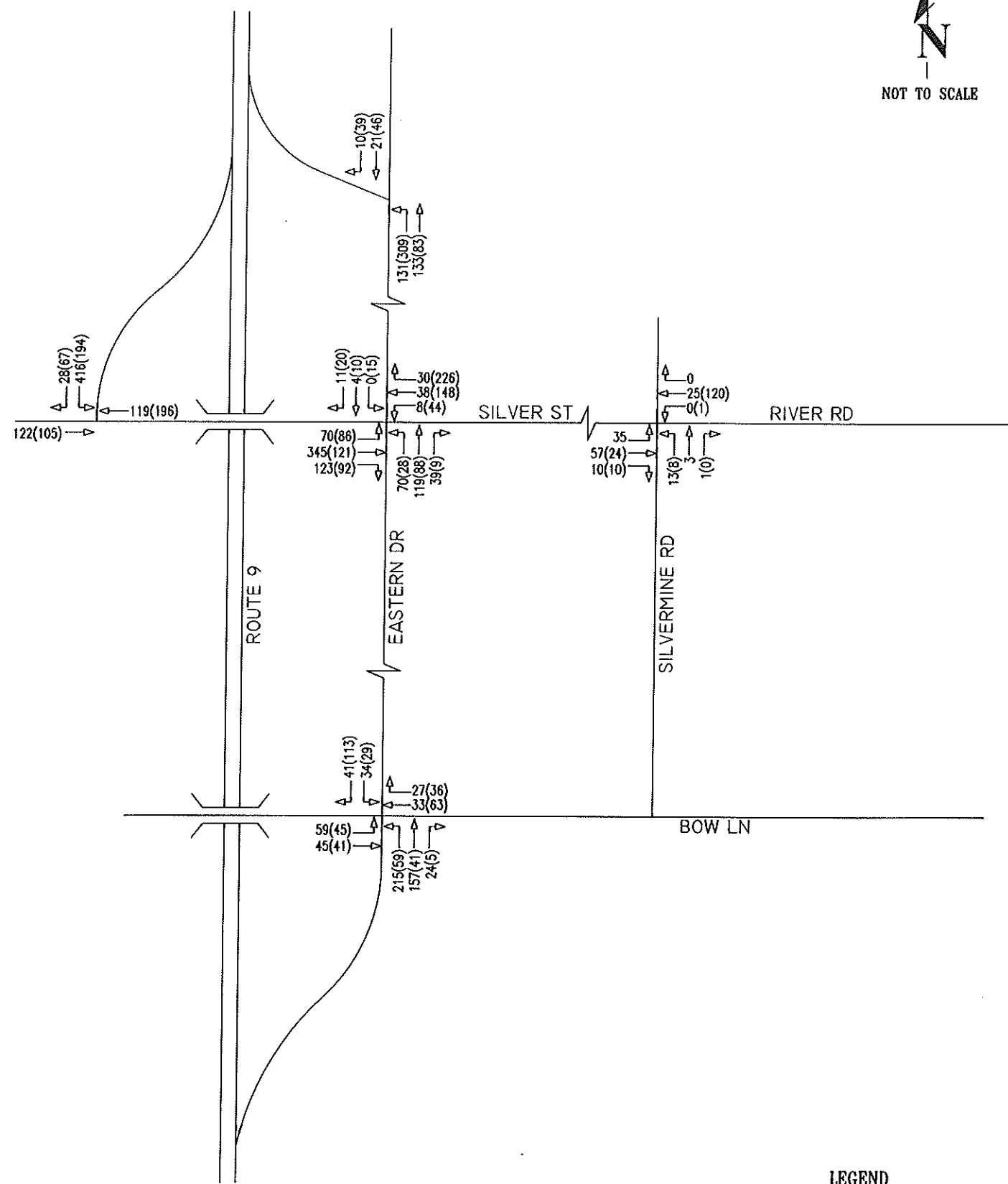
Truck movements for materials delivery and removal would be spread throughout the day on weekdays. Trucks would use prescribed truck routes.

Silvermine Road and River Road

The intersection of Silvermine Road and River Road is a two way intersection. The intersection is unsignalized. There is a stop sign that controls traffic coming from Silvermine onto River Road.

Silver Street and Eastern Drive

The intersection of River Road and Eastern Drive is a four way intersection. The intersection is unsignalized. The intersection is controlled by 2-way stop signs. There are stop signs on Eastern Drive giving the right-of-way to traffic on Silver Street. Eastern Drive runs in a north-south direction. Silver Street Road runs east-west.



LEGEND

00 - PEAK AM HOUR
(00) - PEAK PM HOUR

TRC Raymond Keyes Associates

A Division of TRC Engineers, Inc.

EXISTING TRAFFIC VOLUMES

MIDDLETOWN, CT

DATE: 11/9/01

JOB NO. 33876

FIGURE NO. 4.5-2

Route 9 North Off Ramp and Bow Lane

The Route 9 North off ramp and Bow Lane intersection is a four-way intersection. The intersection is unsignalized. The intersection is controlled by a 4-way stop (stop signs).

Route 9 South Ramp Off Ramp and River Road

The intersection of the Route 9 South off ramp and River Road is an unsignalized one-way intersection. The Route 9 South off ramp is controlled by a stop sign. River Road running east-west is uncontrolled.

4.6 Historic, Cultural, and Archaeological Resources

This section identifies whether known archaeological or historical resources are present on either the generating facility development site or contiguous areas. The potential impacts of the proposed facility on identified resources are also assessed.

A file review at the Connecticut Historical Preservation Office was performed in November 2001. No cultural, historical or archaeological resources were listed as being on the proposed project site. The file review was performed for a one-mile radius. Within the one-mile radius, two find sites (113-015 and 113-003) were identified in the Town of Portland. The Town of Portland is located north of the Project site across the Connecticut River. However, no data was in the file with regard to the two find sites. Because the proposed project is located across the Connecticut River from the recorded sites, no impacts are expected.

The Project site was mined for feldspar from the mid-1950s to the early 1990s. Due to the extensively mined nature of the site, no archaeological resources are anticipated to be located on the site.

4.7 Ecology and Wildlife

4.7.1 Background

Field surveys were conducted to characterize and evaluate existing terrestrial, wetlands, and watercourse habitats on the 137 acre Project site. As is typical, emphasis was placed in delineating and characterizing potential wetland and watercourse habitats due to their regulatory importance. Overall ecological and wildlife characteristics are summarized in the following sections, while inland wetlands and watercourse habitats are characterized in more detail in Section 5.0.

The Project site is situated along the west side of River Road in Middletown adjacent to and up-gradient of the Connecticut River. The existing topography and much of the surrounding area ranges from moderately steep (10-30% slope gradient) to steep (20-60 % slope gradient). Approximately 27% of the site (40 acres) exhibits direct disturbance resulting from over 100 years of mining operations, with portions of the landscape consisting solely of quarry spoils (primarily feldspar tailings and micaceous deposits). The undisturbed portions of the site include

early-mid phase successional plant communities, including terrestrial, forest stands, old-field, quarry-bottom with saturated sediments, and intermittent and perennial watercourses. In addition to these vegetation cover types, open water habitat is present on the site in the form of rain filled quarries positioned at the central and upper portion of the site, not far from Bow Lane.

4.7.1.1 Existing Vegetative Communities

In general, wildlife species respond to the presence and or transitions in vegetative communities. On the Project site it is readily apparent that vegetative communities on site have adapted to disturbance as evidenced by early to mid-successional plant communities. The plant communities observed on the site have previously been extensively altered and some remain in a disturbed condition devoid of vegetation or natural plant community structure. Two dominant terrestrial plant communities were observed and characterized on the Kleen Energy Systems parcel, including *mesic Quercus* (oak) – *Betula* (birch) forested stands, and early-phase old field. There are also two sub-dominant communities on the parcel, including *Alnus rugosa* (speckled alder) stands and a plant community (Chasmophytic) adapted to rock-face and fissure environments, such as quarry walls, characteristically found in vegetation patches. These vascular species are commonly associated with non-vascular species including lichens. Descriptions of the dominant habit types on the site are as follows.

Mesic Quercus (oak) – *Betula* (birch) Northern Hardwood Forested Stand:

This particular stand type is the dominant vegetative cover type on the site and is typically observed on northeasterly facing ridges and slopes where the slope gradient exceeds 20%. Tree species noted within this stand type include the co-dominants *Quercus rubra* (northern red oak) and *Betula lenta* (sweet birch), with scattered *Acer rubrum* (red maple), *Betula allegheniensis* (yellow birch), *Betula pendula* (European white birch), *Acer saccharum* (sugar maple), and *Tsuga canadensis* (eastern hemlock). Within the shrub stratum, *Kalmia latifolia* (mountain laurel) is dominant with scattered occurrences of *Hamamelis virginiana* (witch hazel). The herbaceous layer is poorly developed and only includes *Aralia nudicaulus* (sarsaparilla), *Equisetum* sp. (horsetail), *Polystichum acrostichoides* (Christmas fern), and occasional patches of *Polytrichum commune* (haircap moss).

Within disturbed portions of this stand type, ruderal species tolerant of increased irradiance (light) levels and the microclimate unique to gaps (treefalls) were observed. Specifically, within the tree stratum, *Populus deltoides* (cottonwood) and *Betula populifolia* (gray birch) become more significant components. Within the shrub stratum *Rubus odoratus* (purple flowering raspberry) forms dense thickets, with occasional *Berberis thunbergii* (Japanese berberry) and *Myrica pennsylvanica* (bayberry).

4.7.1.2 Early-Phase Old Field

Small patches of early-phase old-field were observed in various portions of the site in areas cleared during the mining operation. Dominant species include the grass *Schizachyrium scoparium* (little bluestem) and other forbs including *Centaurea maculosa* (spotted knapweed), *Dauca carota* (Queen Anne's Lace), and *Saponaria officinalis* (bouncing bet). Dominant vines

include *Parthenocissus quinquefolia* (Virginia creeper) and *Lonicera japonica* (Japanese honeysuckle). In addition to these species, occasional *Lonicera tatarica* (honeysuckle) and *Juniperus virginiana* (eastern red cedar) scattered throughout this low-standing plant dominated community.

4.7.1.3 Shrub Community - Speckled Alder

A dense monotypic stand of *Alnus rugosa* (speckled alder) was observed occurring in non-hydric soils adjacent to an access road. Although typically associated with wetlands, speckled alder can form dense stands in the absence of hydric soils. This species will often do well in sandy and nutrient poor soils with little to no organic matter and achieves this by means of mycorrhizal associations. Mycorrhizae ("fungus roots") function to simply increase the absorptive surface area of the plants roots which allows the species to maximize nutrients occurring at low levels. This is a symbiotic relationship, whereby the plant obtains nutrients accumulated from the soil by the fungus, and the fungus obtains organic nutrients synthesized by the plant.

4.7.1.4 Wetland and Watercourse Vegetation

Wetland plant communities observed on the site have characteristics of one of two community types: palustrine emergent and palustrine scrub-shrub. Dominant plant species observed within palustrine emergent communities included *Phragmites australis* (giant reed), *Carex lurida* (lurid sedge), *Scirpus cyperinus* (wool grass), and *Juncus effusus* (soft rush). Dominant species observed in scrub shrub communities include *Salix bebbiana* (bebb willow), *Alnus rugosa* (speckled alder), with occasional *Cephalanthus occidentalis* (buttonbush). These species are also species adapted to disturbance, as well as saturated soil conditions.

As described in more detail in Section 5.0, the watercourse channel, which we characterize as having been created during mining operations to control and convey storm and base flow, traverses the middle of the site and includes the following dominant tree species: *Betula lenta* (sweet birch), *Acer rubrum* (red maple), and, *Betula populifolia* (gray birch) saplings. The dominant shrub species observed in this community is *Vaccinium corymbosum* (highbush blueberry). Within the understory, which is poorly developed, scattered patches of *Pilea pumila* (clearweed), *Polystichum acrostichoides* (Christmas fern) and *Polytrichum commune* (moss) dominate, with only rare instances of *Onoclea sensibilis* (sensitive fern), *Smilacina racemosa* (false solomons seal), *Parthenocissus quinquefolia* (Virginia creeper), and *Clethra alnifolia* (sweet pepperbush) seedlings.

4.7.2 Expected Wildlife Species

With respect to potential wildlife, most of the species that may be encountered on the site are likely habitat generalists, and as such, will utilize a broad range of available habitats and food sources, including such transition habitats as wetlands and early successional fields. Additional bird species are likely to be present during spring and fall migrations. Although no rare species were observed during site visits, nor are they expected, the CT Department of Environmental Protection (CTDEP) and the U.S. Fish and Wildlife Service (USFW) will be contacted to review their records for any known occurrences of rare, threatened and endangered species.

The proximity of the Project Site to the Connecticut River affords the possibility that the forested stands discussed above may be used by migrating songbirds (e.g., warblers), during periods of Spring and Fall migration in association with flyway corridor and riverine habitat along the River.

As detailed in Section 5.0 Inland Wetlands and Watercourses, the field surveys revealed a total of nine resource areas ranging in size from 0.02 to 1.4 acres that have characteristics of open water habitat, vegetated wetlands, intermittent and perennial watercourses, or some combination thereof. The wetland plant communities observed on the site presumably developed after the cessation of mining activities that resulted in quarry pits, drainage channels, and depressions left during stages of mining operations. The presence of bedrock, steep side walls, groundwater, and diverted surface water has contributed to saturated soil conditions where, over time, have developed a predominance of wetland (hydrophytic) vegetation. Given the orientation of the watercourse channel, and the location of the quarry pits, the wetland complex on the site functions primarily as a means of controlling the velocity and the sediment load of water leaving the site, with little wildlife significance.

The permanent water present on the site is likely to provide limited habitat for aquatic species such as turtles and amphibian species. During the site visit, *Rana clamitans* (green frogs) were observed along the edges of the open water habitat present at the headwaters of the wetland/watercourse system and the permanent sections of the watercourse. The intermittently standing water present in some of the wetlands and the watercourse channel is anticipated to provide only limited habitat for certain herptiles. It is plausible that some ponded areas on site could function as vernal pool habitat for species such as *Rana sylvatica* (wood frog) and *Pseudacris c. crucifer* (spring peepers).

The absence of natural undisturbed soils on the site render ground-burrowing mammal species (e.g. moles, groundhogs, and shrews) that are typically associated with the surface soil horizon unlikely to persist on this site. Deer, rabbits, and field mice may roam the site since there is extensive adjacent forested land adjacent to the parcel that affords more suitable habitat for these species.

4.7.3 Project Effects on Wildlife

4.7.3.1 Terrestrial Species

Wildlife inhabiting areas of old field and forested areas within the construction footprint may be affected by the Project. However, most of the Project site occurs in areas that have been previously cleared during the mining operations and that large forested sections of the 137-acre site and adjacent properties are undeveloped. Moreover, previously cleared areas that have remained undisturbed since the cessation of mining operations is reverting back to old-field and early successional forest. The consequence of this is that species that utilize these types of habitats will continue to have access to a significant amount of available habitat on the site and within adjacent areas.

Given that this site has a long history of deforestation and other disturbances, the impacts to wildlife resulting from re-development of the site are expected to be insignificant. Based upon the history of disturbance and the resilience of species present on this site, wildlife patterns of movement will return to a pre-disturbance state following the construction of the proposed electric generating facility.

4.7.3.2 *Wetland and Aquatic Species*

Impacts to amphibian and reptile habitat and some species will be compensated for through the construction of both wetland and open water habitat on the site as detailed in Section 5.4 Inland Wetland Mitigation Plan.

4.8 Air Quality

The Project will utilize state-of-the-art technology to control air impacts beginning with the use of two combined-cycle General Electric combustion turbines using sequential combustion dry low NO_x combustors. The combustion turbines will fire natural gas with low sulfur distillate oil as a backup. These basic characteristics will be followed by the most effective post combustion pollution control technologies available – Selective Catalytic Reduction to control NO_x and an Oxidation Catalyst to control CO and VOCs. These controls will be followed by a bank of Continuous Emissions Monitors which will keep plant operators informed of the plant's performance, allowing them to modify operations to ensure compliance with strict permit limits and producing a permanent detailed record of the plant's performance, including any instances of non-compliance, all of which will be available to the regulatory authorities.

In addition to other regulatory approvals, the Project need to obtain Connecticut Department of Environmental Protection (DEP) approval for air permits. The DEP will review the application to assure that the Project take measures to satisfy all requirements under the Clean Air Act. These include:

- Utilizing sophisticated emission controls meeting LAER or BACT as applicable.
- Furthering the State's effort to meet Federal air quality standards for ozone (smog).
- Not contributing to the deterioration of the State's ambient air quality.
- Meeting the State's stringent standards for toxic air pollutants.

The Project will use clean fuels, state-of-the-art combustion technology, and sophisticated post-combustion controls to minimize air emissions. Connecticut's air quality does not meet Federal standards for ozone. Consequently, the Projects emissions of the chemicals that contribute to ozone formation (nitrogen oxides (NO_x) and volatile organic compounds) will have to meet Lowest Achievable Emission Rate (LAER) criteria. Other major pollutants will have to meet Best Available Control Technology (BACT) criteria.

In addition, the Project will be required to offset each ton of the annual potential NO_x emissions by purchasing 1.2 tons of NO_x offsets. Each ton of these offsets is created by permanently eliminating 1 ton of actual NO_x emissions. These reductions are measured, verified, and tracked in accordance with stringent procedures.

The Project should result in a net regional improvement in air quality. The number of generators needed to run to supply electricity is determined by the level of electric load. A generating station can only run if there is load that needs to be served. As the Project will be more efficient than older steam boiler type power plants, it is expected that the Project will often be called upon to generate before older plants. Because the Project will be among the cleanest in Connecticut, any generator it runs in place of would have produced higher emissions than the Project. When the Project is running, displacing older generation, there will be a net reduction in emissions to the atmosphere.

The Project will be required to demonstrate that it will not result in deterioration of the State's ambient air quality. This will be done using sophisticated computer models approved by State and Federal agencies and several years of meteorological data. The EPA approved ISC3ST model will be used to evaluate simple terrain impacts and the DEP specified PTMTPA-CONN model will be used to evaluate complex (hilly) terrain impacts. Five years of meteorological data will be analyzed so all likely combinations of weather conditions will be considered. The resulting computer analyses will be reviewed by the DEP.

Connecticut has enacted stringent regulations concerning the emissions of toxic air pollutants. The Project will comply fully with these standards.

After the Project is constructed, it will be required to demonstrate compliance by the following:

- Conducting in-depth testing to demonstrate that the Project's air emissions compliance with permit limits.
- Installing and operating equipment to continuously monitor air emissions.
- Maintaining detailed records to demonstrate ongoing compliance.

Emissions testing and monitoring will be performed using sophisticated instrumentation and methods specified by the Federal Environmental Protection Agency. The testing protocols will be reviewed by the DEP, and the tests witnessed by DEP testing experts. Continuous monitoring reports will be submitted to the DEP quarterly, and emissions reported annually. The facility will also be subject to periodic inspection by the DEP.

5.0 INLAND WETLANDS AND WATERCOURSE RESOURCES

5.1 Introduction

Several field walkovers were conducted in September and October, 2001 on the 137-acre parcel of land that will be occupied by the Project (the land formerly owned by Feldspar Corporation) to inventory any resources that meet the definitions and criteria of inland wetland and watercourses enumerated in the City of Middletown Inland Wetland and Watercourses (MIWW) regulations. The following describes the methods used to define wetlands and watercourses; the evaluation of the functions and values of these resources; the effect of proposed project layout; and, proposed plans for the mitigation of project effects.

5.2 Wetland and Watercourse Inventory

This section describes wetland and watercourse resources located on the site and an assessment of their functional value.

5.2.1 Inland Resource Determination Methodology

The USGS Middletown Quadrangle (1986) and the City's Inland Wetlands mapping (Nov. 1996) were reviewed and used as a bases for locating areas that exhibit characteristics of inland wetland and watercourse resources. As shown in previous Figure 2.3-1 and Figure C37 in volume II of this document respectively, more than 80 acres of the 137-acre site have been significantly graded during mining operations that ensued for approximately 100 years. Review of these maps reveal the extent of mining disturbance; the mining operation unpaved roadway system; the location of two water-filled quarries to the north side of the site and a central drainage or watercourse through the disturbed area; and, the location of smaller quarry areas and excavated depressions not previously mapped on the City Inland maps. Drawing C37 depicts existing open water, siltation basins, channel and swales, and culvert locations. Also labeled on C37 are Areas 1-9, indicating the areas that have characteristics of MIWW wetlands and watercourse. The water-filled quarries and excavated depressions were delineated during field surveys using the MIWW definitions and "Notes on Criteria Used for Identifying Wet Soils in Connecticut and Rhode Island."

5.2.2 Inland Resource Delineations

A review of the Middletown Inland Wetlands mapping indicates that in 1996 there were two relatively deep quarries (Areas 1 and 1A) and one shallow stream (watercourse) flowing on the west-middle portion of the site. Another shallow stream (Area 2) (watercourse) traverses along the west boundary far from the proposed Project. In addition, a "canal," or what we would characterize as a drainage ditch, was mapped in 1996. We surmise that his channel was excavated and lengthened through the middle of the site to collect and convey surface and ground water seep. Subsequent to the construction of the channel, site drainage has eroded sub-channels and small depressions, some of which formed what we characterize as monotypic low quality wetland plant communities typical of disturbed sites.

Based on a review of the mapping noted above and several field surveys, TRC has determined that the wetland plant communities observed on the site developed after the cessation of mining activities within quarry pits, drainage swales, and depressions. Specifically, given the presence of shallow bedrock, apparent diversions of surface or sheet flow during mining operations have contributed to saturated soil conditions. We estimate that wet areas on site have over approximately 6 years, developed a predominance of hydrophytic vegetation, as a result of their tolerance to adverse soil conditions and frequent saturation (see Section 5.3). The central orientation of the watercourse channel within extensively altered mining areas and steep grades, and its connection to the deep quarry pits, sediment capture, and wet depressions have resulted in a cascading water regime that now functions to control storm flow velocity and trap sediment from water leaving the site. A detailed functional assessment of these areas follows.

5.2.3 Wetland and Watercourse Functional Assessment Summary

A functional assessment of wetlands and watercourses in the proposed project area was performed by TRC based on qualitative wetland functional value definitions provided in the Connecticut Bulletin Number 9 entitled “Method for the Evaluation of Inland Wetlands in Connecticut” (Ammann, Franzen, & Johnson, 1986). The functional assessment conducted for on-site wetlands and watercourses identifies the principal functions exhibited by each resource as well as any characteristics observed or inferred that are in transition or evolution as a result of the cessation of mining activity and site runoff. Wetland functional values can be determined in the field by the observation of various physical site conditions, hydrology, soils, vegetation and vegetation associations, mapping resources, and the application of wetland science and professional judgment. The wetland functional values assessment was conducted for the purpose of describing existing site characteristics, to compare project alternatives, avoid and minimize project impacts, determine the significance of impacts, compare the potential impacts against project benefits, and to design and monitor compensatory wetland mitigation. Table 5-1 summarizes the type and condition of resources located on the site, their functional value, proposed impacts to these areas, and proposed mitigation. The following sections describe in detail the characteristics and functional attributes of the wetlands and watercourses found on the site.

**Table 5-1
Summary of Regulated Areas, Impacts, and Mitigation**

Regulated Area	Type of Resource	Size of Resource	Primary Function(s)/Value (low, med., high)	Project Impact Area	Proposed Mitigation
Areas 1 and 1A- Watercourse	Deep quarry – man-made	1.25 acres and 0.38 acres (54,695 sq. ft. and 16,703 sq. ft.)	Water, nutrient retention; wildlife/ medium	0	None necessary.
Area 2 - Watercourse	Intermittent stream – altered	700 linear feet	Drainage; wildlife/ med.; low	400 linear feet	Restore and enhance to accommodate more flow; improve water quality with improved stream substrate.
Area 3 – Wetland/ Watercourse	Emergent wetland & intermittent watercourse formed in excavated depression.	0.36 acres (15,535 sq. ft.)	Water detention; sediment trap; wildlife/ med.; low	Excavation 0.36 acres (15,535 sq. ft.)	Restore and enhance to accommodate more flow; improve water quality through detention and improve wildlife use by constructing “wet pond” and bordering wetland habitat. 0.25 acres of wetland; 0.25 wet pond
Area 4 – Watercourse	Perennial stream	650 linear feet	Drainage attenuation and conveyance; sediment trap; wildlife use/ med.; low	Re-channel 80 linear feet	Restore channel with existing stone and vegetation
Area 5 – Wetland	Emergent isolated wetland formed in constructed wetland.	0.18 acre (7,839 sq. ft.)	Sediment trap/high	Fill 0.18 acre (7,839 sq. ft.)	Recreate at ratio of at least 1:1.2; improve water quality and wildlife use.
Area 6 – Watercourse/ Wetland	Emergent wetland with stream inlet and outlet formed in deep quarry.	0.44 acres (18,838 sq. ft.)	Drainage attenuation and conveyance; sediment trap; wildlife use/med.; low	Fill 0.15 acres (6,545 sq. ft.)	Recreate adjacent to existing quarry 1:1.5; improve water quality and wildlife use.

5.3 Wetland/Watercourse Descriptions and Functional Attributes

Overall, the wetland functional assessment confirmed the site "hydrologic concept" expressed in foregoing sections. That is, the wetlands and watercourses evaluated have resulted from mining activities and the construction of a central channel to convey surface and ground water seep. As such, this drainage complex controls surface flow on the site fairly well. In general, the wetland plant communities that have developed during recent years function to trap sediment and filter drainage.

The TRC field assessment yielded a total of nine resource areas that exhibit watercourse and wetland characteristics or definitions enumerated in MIWW Section 2.42 or 2.44 respectively. The following describes in detail wetland characteristics of each resource on the site.

5.3.1 Areas 1 and 1A (Watercourse- Open Water/Wetland Scrub-shrub fringe)

Areas 1 and 1A are situated at the highest point along the presumed site hydraulic gradient and are well out of the proposed construction layout. These watercourse ponds have developed within quarry basins and are comprised primarily of open water with an extremely narrow scrub-shrub fringe along the outer margin of the basin and adjoining flat areas. A narrow channel leads out of the basin within which flow is diverted over a series of waterfalls and discharges downslope, forming an intermittent stream.

Dominant plant species observed within the fringe community include *Vaccinium corymbosum* (highbush blueberry) and *Clethra alnifolia* (sweet pepperbush) with an admixture of *Myrica pennsylvanica* (bayberry) and *Kalmia latifolia* (mountain laurel). Scattered throughout the shrub fringe are *Acer rubrum* (red maple) and *Betula lenta* (sweet birch) stems.

Soils along the edge of the basin were comprised of tailings remaining from former quarry operations. There is very little, and in many areas, no organic matter present in bordering areas. Soils within the scrub-shrub fringe could not be effectively described due to an inability to penetrate further than 3 inches into the bedrock substrate.

The water columns in the quarry basins were observed to be nearly clear throughout. Surface runoff and groundwater seep appear to be the source of water for the quarry. Water depths within the basin are unknown. At the time of the initial field investigation, small fish were observed along the margins of the basin pools where water depths averaged 2 feet.

5.3.2 Area 2 (Intermittent Watercourse)

This intermittent channel is dominated with young hardwood trees. Dominant plant species observed within the tree stratum include *Betula lenta* (sweet birch), *Acer rubrum* (red maple), and *Betula populifolia* (gray birch). The dominant shrub species observed include *Vaccinium corymbosum* (highbush blueberry). Within the understory, which was poorly developed, scattered patches of *Pilea pumila* (clearweed), *Polystichum acrostichoides* (Christmas fern) and *Polytrichum communis* (moss) dominated with only rare instances of *Onoclea sensibilis* (sensitive fern), *Smilacina racemosa* (false solomons seal), *Parthenocissus quinquefolia*

Table 5-1 Summary of Regulated Areas, Impacts, and Mitigation					
Regulated Area	Type of Resource	Size of Resource	Primary Function(s)/Value (low, med., high)	Project Impact Area	Proposed Mitigation
Area 7 – Watercourse/ Wetland	Forested wetland formed in excavated depression.	0.12 acre (5,279 sq. ft.) 625 linear feet stream	Drainage attenuation and conveyance; sediment trap; wildlife use.	Re-channel (currently piped) 300 linear feet of stream and 0.06 acre bordering wetland	Recreate 350 feet of stream channel with stone and restore 0.06 acre (3,000 sq. ft.) wetland vegetation for water quality enhancement.
Area 8 – Wetland	Emergent isolated wetland formed in quarry	0.27 acres (11,785 sq. ft.)	Drainage detention and sediment trap; wildlife/med.; medium.	Fill 0.12 acres (5,227 sq. ft.)	Recreate adjacent to existing quarry 1:1.5; improve secondary water quality function with using primary detention basin and constructing as “wet pond.”
Area 9 – Watercourse/ Wetland	Scrub-shrub wetland formed from excavation or erosion situated between access roads.	0.02 acres (871 sq. ft.)	Drainage attenuation and conveyance; sediment trap/low	0	None necessary.
	Total Wetland Acres (emergent) Total Watercourse (stream length)	3.02 acres 1,975 ln.ft.	Total Wetland (emergent) Total Watercourse (stream length)	0.85 780 ln.ft.	Total Wetland/ Watercourse Replacement/Restoration 1.37 acres Total Stream Watercourse Restoration 780 ln. feet

(Virginia creeper), and *Clethra alnifolia* (sweet pepperbush) seedlings). Much of the forest floor is covered by leaf litter.

The plant community observed adjacent to the channel is also characterized as forested. Dominant plant species observed within the tree stratum adjacent plain included *Acer rubrum* (red maple), *Betula lenta* (sweet birch) with scattered *Ostrya virginiana* (American hophornbeam), *Betula populifolia* (gray birch) and *Populus deltoides* (cottonwood). All of these tree species exhibited shallow rooting systems, which in turn contribute to a mild hummock-hollow microtopography. Within the shrub layer, *Lindera benzoin* (spicebush) dominated, while *Pilea pumila* (clearweed) dominated the herbaceous layer, excluding nearly all other species with the exception of scattered *Osmunda cinnamomea* (cinnamon fern).

The channel substrate consists of medium sand with occasional cobbles. Soils within the level land adjacent to the channel are not poorly drained (hydric). The channel itself is more or less rectangular with a bed comprised of a mixture of sand, cobbles, and boulders. Channel width averages approximately three feet.

Upper reaches of the channel convey water out of Area 1, situated between two significant bedrock outcroppings. Water derived from Area 1 is diverted over a series of small rock waterfalls and discharges downslope. Standing water was observed within portions of the channel at a mean depth of four inches, no doubt a result of recent rainfall. Within down-stream portions of the channel, the bed angle lessens and the channel becomes wider with an associated depositional plain. Specifically, channel width increased to five feet, with significant lateral accretion deposits and severe erosion scouring in apparent mine tailings deposited in the area. Where scouring was exceptionally deep, root systems of adjacent tree species are exposed. Standing water was not observed within this portion of the channel. The channel discharges or seeps into Area 3.

5.3.3 Area 3 (Emergent Wetland/Pond)

Area 3 consists of an emergent wetland associated with the intermittent watercourse. This wetland is partly impounded by an adjacent roadway in addition to the steep surrounding topography. *Phragmites australis* (giant reed) dominate the wetland plant community. In addition to this species, *Pilea pumila* (clearweed) was observed in open spaces within the reed stand. Along the edge of the wetland, *Betula lenta* (sweet birch), *Acer rubrum* (red maple), *Hamamelis virginiana* (witch hazel), *Equisetum sp.* (horsetail), and *Aralia nudicaulus* (sarsaparilla) were observed. Along the edge of the wetland at the existing dirt access road, *Salix bebbiana* (Bebb willow), *Osmunda cinnamomea* (cinnamon fern), *Equisetum sp.* (horsetail), and *Polytrichum commune* (moss) have pioneered along a road drainage ditch.

In general, patches of organic matter are present within the surface of this wet area. These soils appear to be mine tailings deposited at various times during mine grading operations. Due to their position in the landscape, that is, down-gradient of an intermittent stream and in a excavated depression, the soils have become obviously saturated. They can be characterized as poorly drained.

Standing water was observed within this wetland in places at a depth of approximately 1-inch. The contribution of groundwater seep is evidenced by the presence of an iron precipitate. This precipitate was observed throughout the wetland and not just in the watercourse bed. Groundwater flow is discharged from the wetland into a narrow channel, which passes over the dirt access road and into Area 4.

5.3.4 Area 4 (Perennial Watercourse)

Area 4 consists of an intermittent watercourse channel that drains into resource Area 6. Plant species observed along the channel included young *Celastrus orbiculatus* (bittersweet), *Acer rubrum* (red maple), *Populus deltoides* (cottonwood), with occasional *Betula alba* (European white birch). A large *Tsuga canadensis* (hemlock) was observed within this community. *Polytrichum* (moss) mats were observed on some of the rocks within the channel.

Mean channel width was approximately three feet and the channel substrate is comprised of cobbles and boulders. Water depths averaged three inches for both pools and riffles within the channel. Water within the channel was observed to be turbid with a suspended solids load derived from the dirt roadway. These solids apparently settled out fairly quickly. Discharge water was observed to be clear after approximately 75 feet. The Fe precipitate was observed in the channel bed after the 75-foot mark.

5.3.5 Area 5 (Isolated Emergent Wetland)

This is a small and isolated emergent wetland that has developed within a quarry basin, or detention basin, apart from the system that has been described thus far. Significant disturbance has occurred along the edges of the wetland as evidenced by the deposition of quarry tailings and a retentive berm constructed of boulders.

Dominant plant species observed within this wetland include *Juncus canadensis* (Canada rush) and *Scirpus cyperinus* (woolgrass). In addition to these species there was an admixture of *Carex lurida* (shallow sedge), *Eleocharis obtusa* (blunt spikerush), and *Typha latifolia* (broad leaf cattail). Scattered shrubs included *Cephalanthus occidentalis* (button bush) and *Salix bebbiana* (bebb willow). The substrate of the pool was covered by a thin layer of a periphyton/algal mat.

Soils within the wetland were extremely shallow, situated on bedrock and are characterized as poorly drained. At the time of the field surveys, no standing water was observed in the wetland, although soils were saturated to the surface. Silt marks on vegetation within the basin indicate that water levels fluctuate as much as 1.5 feet. Given no evidence of groundwater seep, this detention basin wetland is derived from surface hydrology.

5.3.6 Area 6 (Emergent Wetland)

Area 6 is associated with the intermittent watercourse that drains much of the surrounding area and is situated within the largest quarry pit observed on this portion of the site. This is also the largest wetland observed.

The dominant plant species within this wetland is *Phragmites australis* (giant reed), which has formed a monotypic stand. Species occurring at lower frequencies included *Populus deltoides* (cottonwood) and *Betula lenta* (sweet birch). These hardwoods growing at the very edge of the wetland. The dominant species observed includes scattered *Alnus rugosa* (speckled alder) and a vine called *Celastrus orbiculatus* (bittersweet).

Soils within Area 6 were observed saturated to the surface and have characteristics of somewhat poorly drained soils laying on bedrock at approximately 19 inches below the surface. Groundwater input is present, as evidenced by the presence of the iron precipitate and actual flow from the intermittent watercourse that cascades down a 30-foot waterfall at the east end of the wetland. At this point, water discharges from the wetland and flow to a excavated channel from the intermittent watercourse converge. This flow discharges into Area 7. Channel width reaches approximately 5 feet in width. Channel substrate was comprised of equal mixture of sand, gravel and cobbles, and graduates to boulders on the slope situated between Area 6 and Area 7. Fe precipitate was also observed within the watercourse channel.

5.3.7 Area 7 (Emergent Wetland)

Area 7 consists of an intermittent watercourse channel and a small associated forested wetland. Channel width is approximately three feet and the depth of water within the channel is approximately four inches. Flow was observed to be moderate, approximately 1.0 fps. The channel substrate is comprised of mixture of sand, cobbles, and boulders. Within the wetland, the main watercourse divides into a series of smaller "braided" channels.

The dominant plant species observed alongside the watercourse channel include *Alnus rugosa* (speckled alder). Within the wetland the dominant plant species include *Salix nigra* (black willow) with scattered *Ostrya virginiana* (American hophornbeam) and *Populus deltoides* (cottonwood). Within the herbaceous layer, *Pilea pumila* (clearweed) and *Impatiens capensis* (spotted touch-me-not) dominate, with only a small patch of *Phragmites australis* (giant reed).

Soils within this wetland were observed saturated and they have characteristics of poorly drained soils.

The watercourse passes through the wetland and terminates at the point of tangency along the dirt access road. At this point, based on field observations, flow enters a 32" (inner diameter) concrete pipe, which shunts flow beneath the road and parallel for approximately 100 feet. Channel flow resumes for only 20 feet before it is directed into another 32 inch corrugated metal pipe. This pipe passes perpendicularly beneath the dirt road and discharges flow onto the adjacent hillside where it once again becomes channelized. Flow then passes into another 32" pipe, is directed beneath River Road, and then discharges into the Connecticut River.

5.3.8 Area 8 (Emergent Wetland)

Wetland D is a small, isolated scrub-shrub wetland identified alongside the dirt access road within the construction laydown area. Dominant plant species observed within the wetland include *Alnus rugosa* (speckled alder), *Salix bebbiana* (bebb willow), and *Scirpus cyperinus*

(woolgrass). Within this plant community, the speckled alders formed a fairly dense stand of interlocking individuals. To the north of this shrub-dominated community is a monotypic stand of *Phragmites australis* (giant reed), with an admixture of *Carex lurida* (shallow sedge) and scattered *Alnus rugosa* (speckled alder).

Bedrock was observed at 12 inches in this wetland. Soils within the wetland have characteristics of poorly drained soils. This wetland is essentially an isolated pool. It appears to receive primarily surface water and is generally in an elevated position within the landscape relative to the other wetlands identified on the site. Although there is a v-shaped ditch situated at the northern border of the wetland, there was no evidence of significant flow out of the channel; there was no evidence by scour marks or deposited material. Drainage diversions located in the surrounding area appear to have been excavated during mining operations at various times, and subsequently abandoned.

5.3.9 Area 9 (Emergent Wetland)

Area 9 is a very small emergent scrub-shrub wetland and is the most downgradient wetland identified on the site. It is bisected by the perennial watercourse described as Area 7 above. The wetland itself is situated in a depression between two access roads.

Dominant plant species observed within the wetland include *Lindera benzoin* (spicebush), *Pilea pumila* (clearweed), *Alnus rugosa* (speckled alder), and *Dryopteris cristata* (crested fern).

Bedrock was observed at 16-inches, rendering the soils as poorly drained. This wetland appears to be driven primarily by groundwater discharge. Specifically, the wetland occurs on a fairly steep slope and soils were saturated throughout. Water depths within the watercourse channel at the time of the site visit were on the order of 2-3 inches. Watercourse width within the wetland is two feet.

5.4 Wetland Functional Values and Impact Assessment

5.4.1 Functions and Value Assessment Methodology

The functions and values of wetlands and watercourse resources on the site were assessed based on the definitions enumerated in the DEP Bulletin Number 9 entitled "Method for the Evaluation of Inland Wetlands in Connecticut: A Watershed Approach" (Ammann et al., 1986). Applicable functional attributes considered in evaluating the wetlands and watercourses on site are summarized as follows:

- (1) Ecological Integrity – Evaluates the overall health and function of the wetland ecosystem.
- (2) Wildlife Habitat – Evaluates the suitability of the wetland as habitat for species generally associated with wetlands and wetland edges. No single species or group of species is emphasized.

- (3) Finfish Habitat – Evaluates the suitability of watercourses associated with the wetland for either warm-water or coldwater fish. No single species or group of species is emphasized.
- (4) Educational Potential – Evaluates the suitability of the wetland as a site for an “outdoor classroom.”
- (5) Visual /Aesthetic Quality – Evaluates the visual and aesthetic values of the wetland.
- (6) Water Based Recreation – Evaluates the suitability of the wetland and associated watercourses for non-powered boating, fishing, and other similar recreational activities.
- (7) Flood Control – Evaluates the effectiveness of the wetland in reducing watercourse flooding.
- (8) Groundwater Use Potential – Evaluates the potential use of the underlying aquifer as a drinking water supply.
- (9) Nutrient Retention and Sediment Trapping – Evaluates the effectiveness of the wetland as a trap for sediment and nutrients in runoff water from surrounding upland.
- (10) Noteworthiness – Evaluates the wetland for certain special values such as critical habitat for endangered species, etc.

5.4.2 Wetland Functional Assessment

With the exception of Areas 5 and 8 (isolated wetlands) all resource areas are linked by a perennial watercourse channel. Due to the disturbed origin and nature of the wetlands and watercourses identified on the site, the functional significance of any one area is considered very low. Consequently, the following sections discuss the functional values associated with the watercourse and associated wetlands as a wetland/watercourse complex. The isolated wetlands identified as Areas 5 and 8 will be described separately. Figure C37 depicts the existing topography and regulated areas on the site with the proposed Kleen Energy Generating Facility overlay. Table 5-1 lists and summarizes the wetland and watercourses located on the site, their type, and relative size, and primary functional value, as well as the affected area (fill or alteration) resulting from the proposed layout of the Middletown Generation Project. In addition, Table 5-1 lists the proposed compensation area for areas affected by the Project.

5.4.2.1 Watercourse/Wetlands Areas 1-4, 6,7, and 9

This wetland and drainage complex inherently provides two principal functional values Nutrient Retention and Sediment Trapping. A minor functional value identified is wildlife habitat, has developed in this complex as a result of the cessation of mining activities and the presence of a varied water regime. Other functions are either non-existent or considered so low in significance, they are not evaluated.

Nutrient Retention and Sediment Trapping:

The conditions or qualifiers that indicate the wetland/watercourse complex onsite has the potential for nutrient retention and sediment trapping include:

- There are potential sources of excess sediment in the surround sub-watersheds surrounding the wetland/watercourse complex;
- Rock-lined channels, depressions that have formed into wetlands trap sediments;
- Organic/sediment deposits have formed within the quarry bottoms;
- Vegetation has formed in depressions which may utilize excess nutrient and attenuate flows through the wetlands;

Wildlife Habitat:

The following conditions and qualifiers apply to this attribute on site:

- Wetlands and channels are contiguous;
- Wildlife may use this wetland/channel complex for overland access and cover to other wetlands and upland;
- Plant/animal indicator species are present, that is, some of the wetlands have habitat characteristics for amphibian populations and cover for bird activity.

5.4.2.2 Potential Impact on Functional Attributes of Areas 1-4,6,7 and 9

The central wetland/watercourse complex eventually drains to the Connecticut River via a surface and groundwater discharge. Although the wetlands associated with the watercourse are small relative to the overall drainage watershed, the headwater location make flow attenuation and sediment trapping the primary functional attribute on this site. Based upon landscape position and previous disturbance, any fill-related impacts to onsite wetlands and watercourses could change the capacity for nutrient retention and sediment trapping on the site. Other minor functions exhibited by the wetlands associated with the watercourse and the isolated wetlands, namely wildlife habitat, would also be lost or compromised by filling or excavation. However, given the existing disturbed nature of the wetlands and surrounding landscape, this function presumably occurs at a very low level. As demonstrated in the Mitigation Plan enumerated in Section 5.5, these functional attributes not only can be maintained, they can be enhanced.

5.4.3 Isolated Wetlands (Areas 5 and 8)

The isolated wetlands provide two functional values with the primary function identified as Nutrient Retention and Sediment Trapping. The secondary functional value identified is wildlife habitat (namely amphibian habitat).

5.4.3.1 *Nutrient and Sediment Trapping*

The conditions or qualifiers that exist for this function in these two isolated wetlands include:

- There are potential sources of excess sediment that may drain to these areas;
- There are saturated soils in these areas that are vegetated and provide nutrient retention and water flow attenuation.

5.4.3.2 *Wildlife Habitat*

The following conditions or qualifiers apply to these two isolated wetlands:

- These wetlands provide conditions suitable for amphibian populations and potential avian cover.

5.4.3.3 *Potential Impact of Functional Attributes of Areas 5 and 8*

Given their isolated location within a heavily disturbed sub-watershed, these wetlands may provide some trapping of sediments and the retention and transformation of nutrients. However, due to their isolation from the central watercourse that leads to the Connecticut River, their importance is considered low for this function. Their significance in terms of wildlife potential, such as vernal pool habitat is higher. If these areas are filled, amphibians utilizing these isolated wetlands would be displaced. However, most of the proposed project site occurs in areas that have been disturbed during the quarry and mining operation. Given that this site has a long history of deforestation and other disturbances, the impacts to amphibians are expected to be temporary or minor in terms of population density. Indeed, a majority of the wetland complex will remain undeveloped or in certain cases will be enhanced. Specifically, as indicated in the proposed mitigation plan (see Section 5.5), impacts to amphibian and reptile species will be compensated through the construction of both wetland and open water habitat on the site. The consequence of this is that amphibian species are expected to utilize these created habitats and continue to have access to a significant amount of available adjacent habitat on the site. Based upon the history of disturbance and the resilience of species present on this site, amphibian patterns of movement will return and exceed the pre-disturbance state following the construction of the Kleen Energy Systems facility.

5.5 **Wetland Mitigation Plan**

5.5.1 *Sediment and Erosion Control Measures*

Wetlands and watercourses located outside of the layout of the Project will be protected from indirect impacts from erosion and siltation through the implementation of Best Management Practices (BMP's) prepared as part of Kleen Energy Systems Erosion/Sediment Control Plan. The proposed BMP's will minimize erosion, the migration of sediments, and adverse impacts to the wetland/watercourse on the site. These BMP's will include the use of detention ponds, grassed swales with temporary sediment traps, and haybale and/or silt fence barriers to minimize erosion and sedimentation outside the limits of construction, and stabilized construction

roadways. Both construction and operational stormwater will be controlled according to existing sub-drainage areas on the site to maintain or even reduce peak storm water flows. The proposed sedimentation basins have been sized to correspond with their respective sub-watershed area (Figure C44 depicts the overall Erosion and Sediment Control Plan for the proposed project) to capture peak flows, and secondary "wet ponds" and wetland areas will be created to provide additional storm flow attenuation, sediment trapping, and enhance wetland and wildlife habitat.

Design measures taken to provide effective sediment and erosion control within the areas during construction include the concept of a series of appropriately sized catch basins and rock-lined and grass-lined swales/ditches that direct stormwater runoff to the detention ponds and wet ponds; silt barriers around stockpile areas; a site roadway system that will decrease road grades and employ a series of catch basins that will discharge to appropriately engineered detention basins and secondary wet ponds; and, during facility operation, a landscape plan that will include re-seeding all disturbed areas on the site and plantings in wetland areas.

The facility site stormwater control plan directs site runoff to nine detention basins, which have been designed to address state and local stormwater management guidelines. The stormwater runoff design maintains the existing drainage patterns present at the site. Sheet flow will be directed to constructed rock or grass swales, which will then be discharged to the proposed sedimentation basins.

Sediment and erosion controls will be installed in those areas where the placement of additional topsoil and the removal of vegetation are proposed. Geotextile fabric and haybales will be used to prevent erosion. This combination will effectively minimize sediment transport into onsite wetlands/watercourses and the Connecticut River. Temporary sediment and erosion control structures will be left in place until all exposed soil has successfully re-vegetated.

5.5.2 Proposed Wetland Restoration and Compensation

As previously described, the wetlands and watercourses observed on the site presumably developed into the wetland/watercourse complex observed today after the cessation of mining activities on the site. The existing wetland complex on the site is functioning as a means of controlling the velocity and the sediment load of water leaving the site in addition to providing low quality aquatic wildlife habitat.

The primary goals of the wetland compensation/mitigation plan herein is to minimize the filling of the wetland drainage complex on the site and expand those wetland functions found and within the existing wetlands/watercourses. Overall, this mitigation strategy will improve water quality discharging the site to the Connecticut River. A secondary goal is to increase the wildlife habitat potential on the site by introducing additional native wetland plant species in increased species richness (i.e. species structure and diversity). Specifically, the target plant species will consist of primarily aquatic and palustrine emergent wetland species. This can be achieved within both the restored and created wetlands proposed as mitigation. Kleen Energy Systems proposes to restore and create 1.37 acres wetlands and 780 feet of stream on the site, a net increase of 0.52 acres wetlands and 50 linear feet of stream habitat.

5.5.2.1 Soils

Wetland soils in areas to be filled will be inspected for possible use in wetland creation areas. If these soils possess little or no organic matter, or contain only reed root-stock, they will not be re-used in wetland areas. In those areas where topsoil thickness is insufficient or where additional grading is proposed for newly created wetland areas, additional loam will be added as organic soil layer. At least eight inches of natural or manmade topsoil, depending upon on-site conditions will be placed in the wetland mitigation areas.

5.5.2.2 Vegetation

Native wetland species of the region will be used to re-vegetate wetland areas. Species not specified in the mitigation plan shall not be used without written approval. During the re-planting phase of the mitigation plan, a Wetland Biologist will plant discrete clusters of plants with suitable hydrology and soils as specified on an approved planting plan. The wetland restoration areas will consist of shallow basins that will include both deep marsh or open wet pond areas (water depths > 18”), shallow marsh (water depths = 6”-18”) and wet meadow (water depths = 0”-6”) zones that may serve as potential habitat.

Within the deep marsh zone, it is proposed that the following species be planted:

- Scirpus validus* (soft-stem bulrush)
- Scirpus acutus* (hard-stem bulrush)
- Pontederia cordata* (pickerelweed)

Within the shallow marsh zone, it is proposed that the following species be planted:

- Sparganium americanum* (burreed)
- Sagittaria latifolia* (arrowhead)
- Scirpus americanus* (common three-square)

Within the wet meadow zone, it is proposed that wetland seed mix containing some or all of the following species be planted:

- | | |
|---|--|
| <i>Carex crinata</i> (fringed sedge) | <i>Carex lurida</i> (lurid sedge) |
| <i>Glyceria canadensis</i> (Canada manna grass) | <i>Scirpus atrovirens</i> (green bulrush) |
| <i>Verbena hastata</i> (blue vervain) | <i>Eupatoriadelphus maculatus</i> (joe-pye weed) |
| <i>Scirpus cyperinus</i> (woolgrass) | <i>Carex lupulina</i> (hop sedge) |
| <i>Cyperus esculentus</i> (chufa) | <i>Panicum rigidulum</i> (red-top panic grass) |
| <i>Eupatorium perfoliatum</i> (boneset) | <i>Carex comosa</i> (bearded sedge) |

The different species contained in the wetland seed mix can tolerate some variation in the hydroperiod. Some or a number of different wetland plants within the seed mix will cover all of the wetland restoration area. The emergent dominated wetland plant community was selected to effectively out-compete less desirable species, purple loosestrife (*Lythrum salicaria*) and giant reed (*Phragmites australis*).

The seed will be applied in the late fall (after October 15) or early spring to avoid the potential for the winter kill of newly germinated seedlings. The recommended application for a wet meadow is 1 pound per 2,500 square feet. The seed will be applied using the hydroseed method or with straw mulch to minimize erosion and provide a favorable germination medium.

Where present, common reed (*Phragmites australis*) shall be controlled in the restoration areas. This shall be accomplished by early removal or by treating the *Phragmites* after the tasseling stage (gone to seed) in August or September. If the *Phragmites* is mixed with other vegetation, each *Phragmites* stem shall be individually treated by wiping individual stems with herbicide. If the *Phragmites* is grouped, the herbicide may be sprayed over the stand. The applied herbicide shall be a 5% solution of either Rodeo or Roundup. Rodeo shall be used in areas of standing water. Roundup shall be used in all other areas. Treatment shall be performed in the first year following construction completion and for two subsequent seasons. Rodeo shall not be applied if rain is forecast within 24 hours.

5.5.2.3 Proposed Post-Construction Monitoring and Reporting

In accordance with generally accepted Wetland Mitigation Standards, for each of the first three full growing seasons following construction of the mitigation site(s), the site(s) shall be monitored and monitoring reports shall be submitted no later than December 15 of the year being monitored. The following four success-standard observations shall be reported and shall address in narrative format. The post-construction assessment shall:

- Summarize the original or modified mitigation goals and discuss the level of attainment of these goals at each mitigation site.
- Describe significant problems and solutions during construction and maintenance (monitoring) of the mitigation site(s).
- Identify agency procedures or policies that encumbered implementation of the mitigation plan. Specifically note procedures or policies that contributed to less success or less effectiveness than anticipated in the mitigation plan.
- Recommend measures to improve the efficiency, reduce the cost, or improve the effectiveness of similar projects in the future.

The reports shall also include the four monitoring-report appendices listed below:

Appendix A: A copy of this permit's mitigation special conditions.

Appendix B: An as-built planting plan.

Appendix C: A vegetative species list of dominant volunteer species in each plant community type. Dominant volunteer species will include those that cover over 5% of their vegetative layer.

Appendix D: Representative photos of each mitigation site taken from the same locations for each monitoring event.

The first year of monitoring shall be the first year that the site has been through a full growing season (starting May 31) after completion of construction and planting. If there are problems that need to be addressed and if the measures to correct them require prior approval, the permittee shall contact the appropriate agency by phone or letter as soon as the need for corrective action is discovered.

Success Standards:

Remedial measures shall be implemented to attain the four success standards described below within the three growing seasons after completion of construction of the mitigation site(s). Measures requiring earth movement or changes in hydrology shall not be implemented without written approval.

- (1) Have at least 75% of the plantings survived.
- (2) Each mitigation site(s) have at least 80% area cover by noninvasive wetlands plants (hydrophytes). For the purpose of this success standard, invasive hydrophytes include:
Common reed (*Phragmites australis*)
Purple loosestrife (*Lythrum salicaria*)
- (3) Common reed and purple loosestrife at the mitigation site(s) will be controlled.
- (4) All slopes within and adjacent to the mitigation site(s) will be stabilized.

In order to achieve accepted Wetland Mitigation standards, the proposed post-construction monitoring/sampling scheme will be conducted over the course of three growing seasons and will include the following components.

Photographic Stations:

To visually document plant community development, photographic stations will be established within the wetland restoration area. In addition, quantitative sampling of the wetland plant community will also be undertaken using the techniques illustrated below.

Sampling Protocol:

A single linear transect will be established within each wetland restoration area perpendicular to both contour intervals and environmental gradients. Each end of the transect will be marked with a permanent wooden stake. Along the transect, 25cm x 50cm rectangular quadrats will be positioned at regular intervals and will also be marked in the field. The same plots will be used during the second sampling season. In this manner, changes in plant percent cover and species composition over the two growing seasons can be accurately determined.

Percent cover will be determined by visually estimating both plant percent cover and the percent cover of bare substrate within each 25cm x 50cm rectangular quadrat. Once these data have

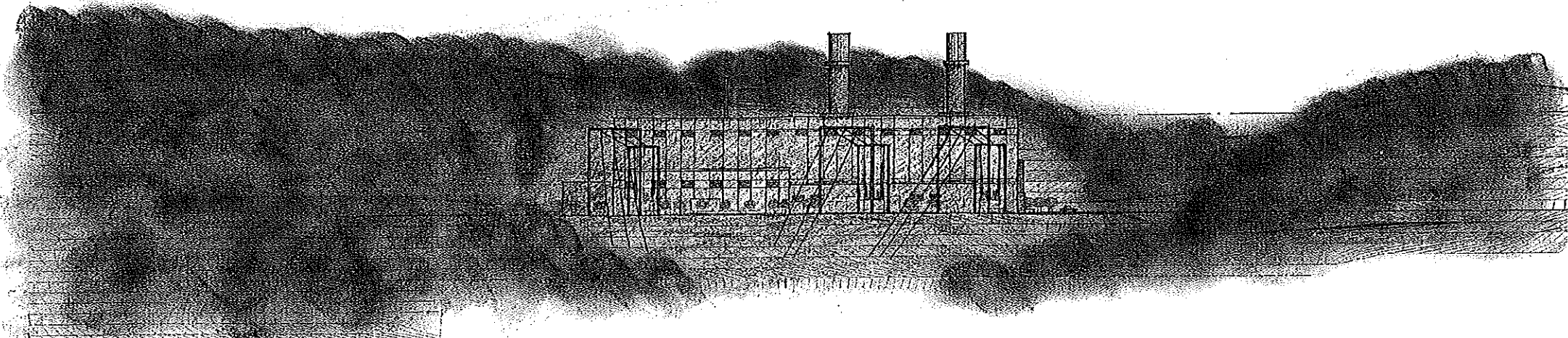
been collected, each plant species encountered will be lumped into its respective USFWS indicator status category. Lastly, relative percent cover will be determined by dividing the percent cover total for a given class by the total percent cover for all species and bare space combined.

Remedial Actions:

A discussion of all remedial actions taken during the year to ensure conformance with the four performance standards will be included in the monitoring report. This will include the results of herbicide applications and any other remedial actions taken. In addition, recommendations will be made as to the efficacy of each of the remedial measures undertaken.

Nothing beyond
this point

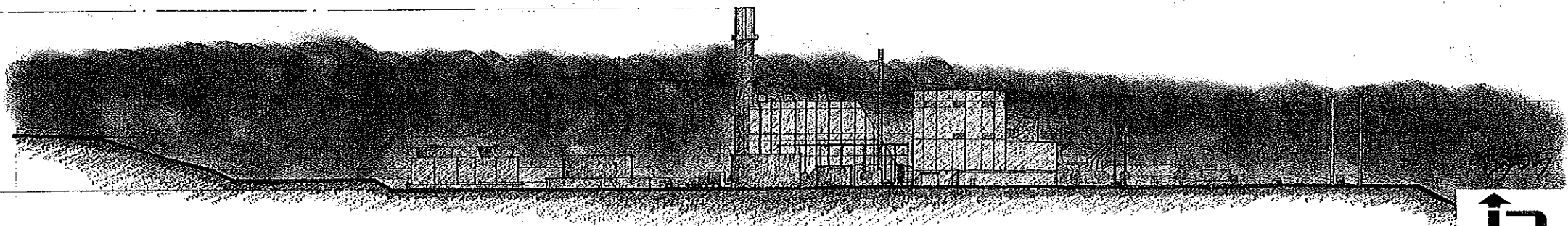
Thanks!!



N O R T H E L E V A T I O N

1" = 40'

Top of Roof
el.
Power Plant
el.



E A S T E L E V A T I O N

1" = 40'

Top of Stack
el.

Power Plant
el.



Kleen Energy Systems L.L.C.

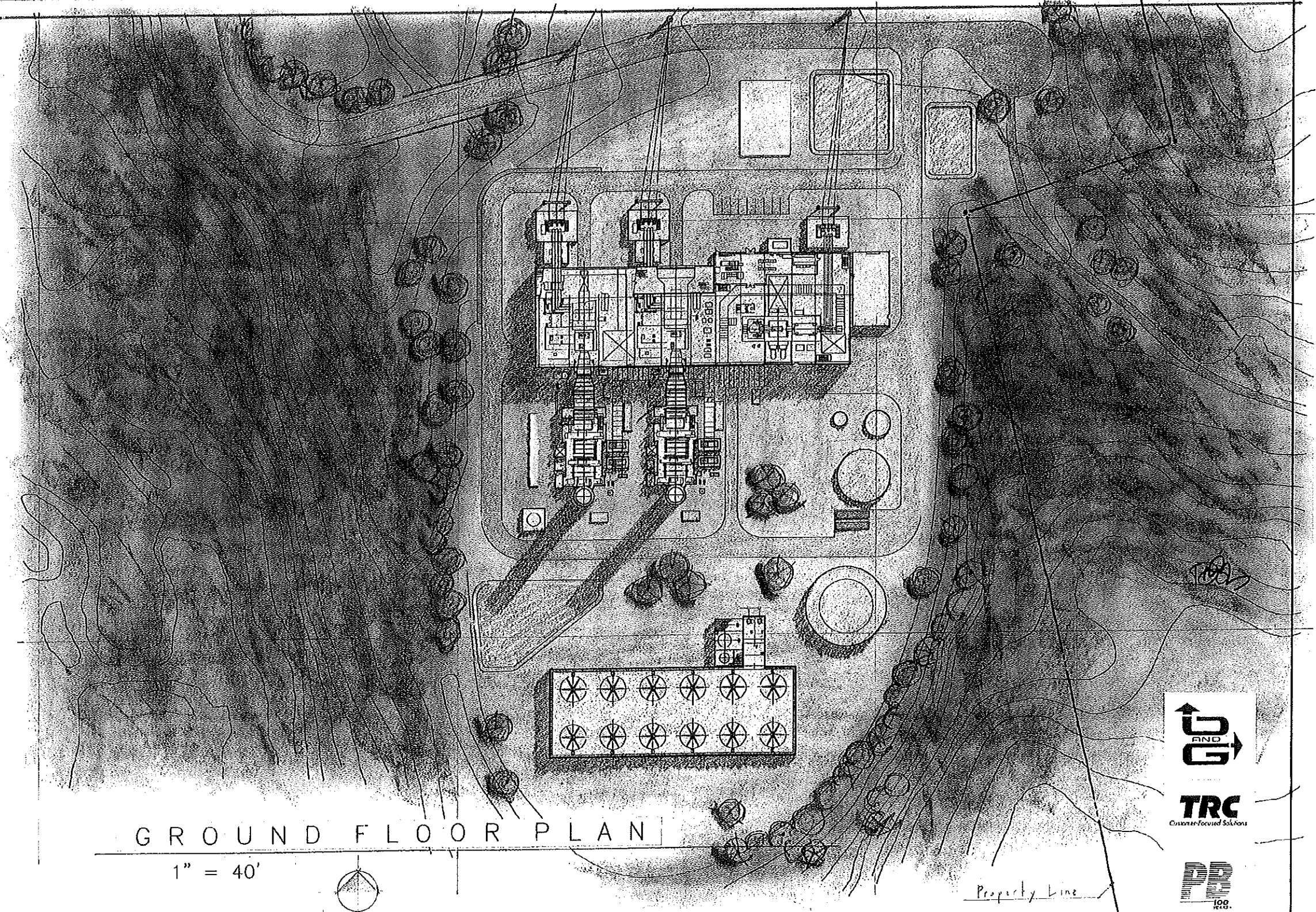
Ametta & Associates
MIDDLETOWN, C.T.



TRC
Customer Focused Solutions

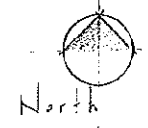


PB Power Inc.



GROUND FLOOR PLAN

1" = 40'



Property Line



Kleen Energy Systems L.L.C.

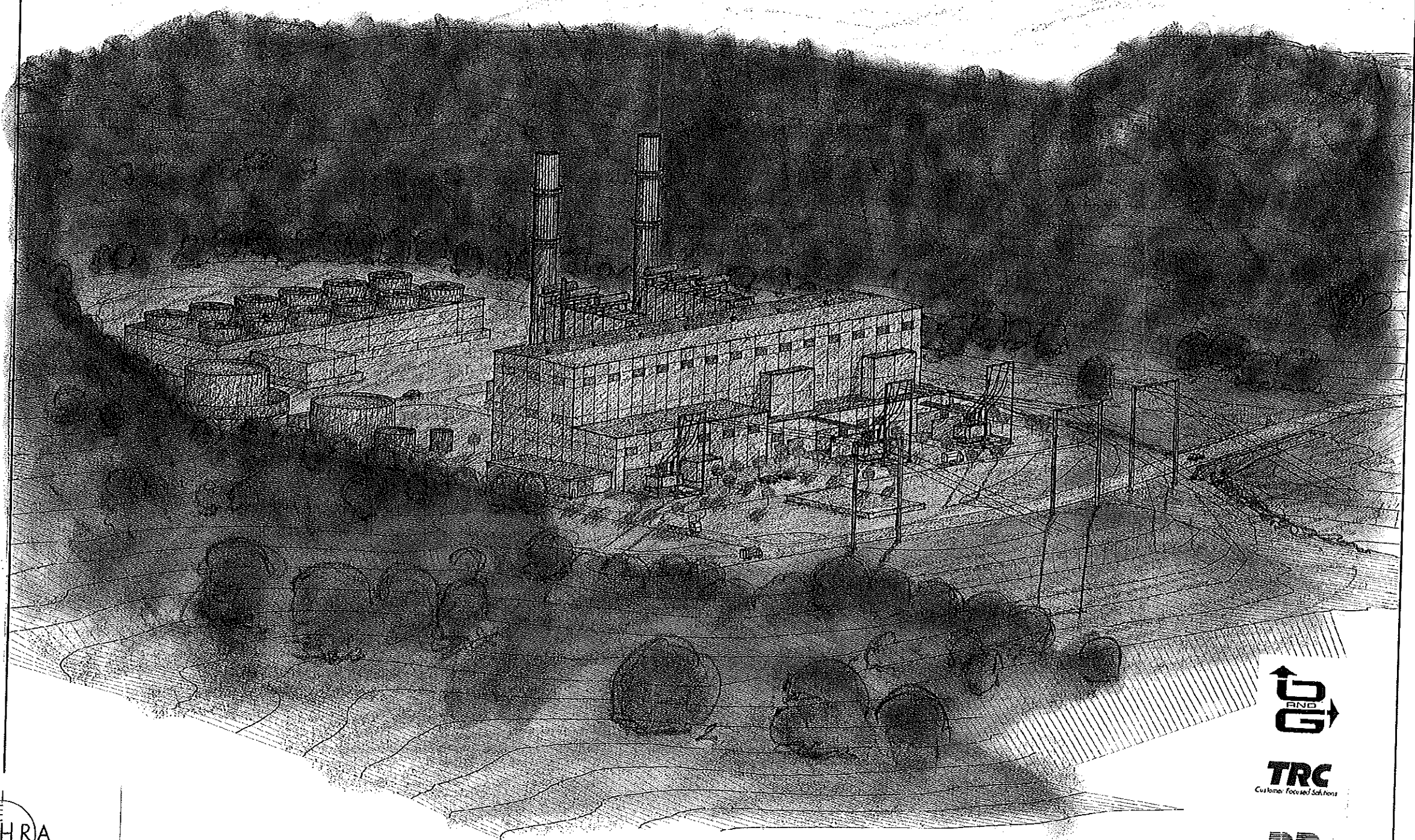
Armotta & Associates
MIDDLETOWN, C.T.



TRC
Customer Focused Solutions



33876/RENDER1



Kleen Energy Systems L.L.C.
Armetta & Associates
MIDDLETOWN, C.T.



TRC
Custom Focused Solutions



APPENDIX B

STA TYPE:7 0827049N1997
STA NO 082 7049

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA
TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE 9 DIRECTION N
LOC N.B. OFF RAMP TO BOW LANE
DAY SUN MON TUES WED THUR FRI SAT
DATE 0 0 0 604 605 0 0
TYPE
HOUR 1997 ADT = 1600 ACF = NA
BEG *****
12A 0 0 0 0 13 0 0
1A 0 0 0 0 3 0 0
2A 0 0 0 0 5 0 0
3A 0 0 0 0 7 0 0
4A 0 0 0 0 11 0 0
5A 0 0 0 0 21 0 0
6A 0 0 0 0 149 0 0
7A 0 0 0 249 0 0 0
8A 0 0 0 239 0 0 0
9A 0 0 0 137 0 0 0
10A 0 0 0 92 0 0 0
11A 0 0 0 67 0 0 0
12P 0 0 0 84 0 0 0
1P 0 0 0 62 0 0 0
2P 0 0 0 122 0 0 0
3P 0 0 0 102 0 0 0
4P 0 0 0 109 0 0 0
5P 0 0 0 97 0 0 0
6P 0 0 0 68 0 0 0
7P 0 0 0 43 0 0 0
8P 0 0 0 52 0 0 0
9P 0 0 0 30 0 0 0
10P 0 0 0 28 0 0 0
11P 0 0 0 25 0 0 0
TOT 0 0 0 1606 209 0 0
RECORDER 104 24 HR = 1815 G - 4

STA TYPE:7 082705081997
STA NO 082 7050

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA
TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE 9 DIRECTION S
LOC S.B. OFF RAMP TO SILVER STREET

DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	0	0	605	606	0

TYPE
HOUR 1997 ADT = 3700 ACF = NA
BEG *****

12A	0	0	0	0	38	0
1A	0	0	0	0	23	0
2A	0	0	0	0	26	0
3A	0	0	0	0	29	0
4A	0	0	0	0	33	0
5A	0	0	0	132	0	0
6A	0	0	0	438*	0	0
7A	0	0	0	362	0	0
8A	0	0	0	380	0	0
9A	0	0	0	206	0	0
10A	0	0	0	177	0	0
11A	0	0	0	174	0	0
12P	0	0	0	200	0	0
1P	0	0	0	222	0	0
2P	0	0	0	303	0	0
3P	0	0	0	319	0	0
4P	0	0	0	257	0	0
5P	0	0	0	222	0	0
6P	0	0	0	144	0	0
7P	0	0	0	124	0	0
8P	0	0	0	95	0	0
9P	0	0	0	81	0	0
10P	0	0	0	77	0	0
11P	0	0	0	102	0	0
TOT	0	0	0	24015	149	0
RECORDER 132			24 HR.	4164		G - 4

STA TYPE:7 0827049N1994
STA NO 082 7049

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA

TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE 9 DIRECTION N
LOC N.B. OFF RAMP TO BOW LANE

DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	0	1109	1110	0	0

TYPE
HOUR 1994 ADT = 1700 ACF = NA

BEG *****

12A	0	0	0	0	32	0	0
1A	0	0	0	0	2	0	0
2A	0	0	0	0	3	0	0
3A	0	0	0	0	6	0	0
4A	0	0	0	0	11	0	0
5A	0	0	0	0	19	0	0
6A	0	0	0	0	127	0	0
7A	0	0	0	0	228	0	0
8A	0	0	0	265*	0	0	0
9A	0	0	0	124	0	0	0
10A	0	0	0	102	0	0	0
11A	0	0	0	101	0	0	0
12P	0	0	0	82	0	0	0
1P	0	0	0	104	0	0	0
2P	0	0	0	110	0	0	0
3P	0	0	0	137	0	0	0
4P	0	0	0	90	0	0	0
5P	0	0	0	93	0	0	0
6P	0	0	0	60	0	0	0
7P	0	0	0	47	0	0	0
8P	0	0	0	24	0	0	0
9P	0	0	0	10	0	0	0
10P	0	0	0	24	0	0	0
11P	0	0	0	22	0	0	0
TOT	0	0	0	1395	428	0	0
RECORDER 028				24 HR = 1823		G - 4	

STA TYPE:7

0827049N1993
STA NO 082 7049

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA
TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE 9 DIRECTION N
LOC N.B. OFF RAMP TO BOW LANE

DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	615	616	0	0	0

TYPE	1993 ADT =	1600	ACF = NA
HOUR	*****		
BEG	*****		

12A	0	0	0	18	0	0	0
1A	0	0	0	4	0	0	0
2A	0	0	0	1	0	0	0
3A	0	0	0	4	0	0	0
4A	0	0	0	5	0	0	0
5A	0	0	0	19	0	0	0
6A	0	0	0	134	0	0	0
7A	0	0	215*	200	0	0	0
8A	0	0	212	201	0	0	0
9A	0	0	118	102	0	0	0
10A	0	0	101	101	0	0	0
11A	0	0	80	20	0	0	0
12P	0	0	103	102	0	0	0
1P	0	0	86	0	0	0	0
2P	0	0	120	0	0	0	0
3P	0	0	136	0	0	0	0
4P	0	0	86	0	0	0	0
5P	0	0	78	0	0	0	0
6P	0	0	72	0	0	0	0
7P	0	0	44	0	0	0	0
8P	0	0	32	0	0	0	0
9P	0	0	21	0	0	0	0
10P	0	0	47	0	0	0	0
11P	0	0	24	0	0	0	0
TOT	0	0	1575	385	0	0	0

RECORDER 24 HR = 1760 G - 4

STA TYPE:7 0827050S1993
STA NO 082 7050

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA

TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE 9 DIRECTION S
LOC S.B. OFF RAMP TO SILVER STREET

DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	615	616	0	0	0

TYPE
HOUR 1993 ADT = 3600 ACF = NA
BEG *****

12A	0	0	0	20	0	0	0
1A	0	0	0	16	0	0	0
2A	0	0	0	8	0	0	0
3A	0	0	0	8	0	0	0
4A	0	0	0	30	0	0	0
5A	0	0	0	71	0	0	0
6A	0	0	0	455	0	0	0
7A	0	0	333	0	0	0	0
8A	0	0	371	0	0	0	0
9A	0	0	217	0	0	0	0
10A	0	0	165	0	0	0	0
11A	0	0	163	0	0	0	0
12P	0	0	228	0	0	0	0
1P	0	0	250	0	0	0	0
2P	0	0	300	0	0	0	0
3P	0	0	295	0	0	0	0
4P	0	0	217	0	0	0	0
5P	0	0	174	0	0	0	0
6P	0	0	122	0	0	0	0
7P	0	0	146	0	0	0	0
8P	0	0	86	0	0	0	0
9P	0	0	74	0	0	0	0
10P	0	0	99	0	0	0	0
11P	0	0	114	0	0	0	0
TOT	0	0	3354	608	0	0	0

RECORDER 24 HR = 3962 G - 4

STA TYPE:7 0827051N1993
STA NO 082 7051

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA
TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE 9 DIRECTION N
LOC N.B. ON RAMP FROM EASTERN DRIVE
DAY SUN MON TUES WED THUR FRI SAT
DATE 0 0 615 616 0 0 0
TYPE
HOUR 1993 ADT = 2700 ACF = NA
BEG *****
12A 0 0 0 125 0 0 0
1A 0 0 0 4 0 0 0
2A 0 0 0 14 0 0 0
3A 0 0 0 5 0 0 0
4A 0 0 0 7 0 0 0
5A 0 0 0 28 0 0 0
6A 0 0 0 105 0 0 0
7A 0 0 0 278 0 0 0
8A 0 0 150 0 0 0 0
9A 0 0 112 0 0 0 0
10A 0 0 112 0 0 0 0
11A 0 0 161 0 0 0 0
12P 0 0 167 0 0 0 0
1P 0 0 110 0 0 0 0
2P 0 0 168 0 0 0 0
3P 0 0 507* 0 0 0 0
4P 0 0 316 0 0 0 0
5P 0 0 188 0 0 0 0
6P 0 0 96 0 0 0 0
7P 0 0 88 0 0 0 0
8P 0 0 45 0 0 0 0
9P 0 0 65 0 0 0 0
10P 0 0 40 0 0 0 0
11P 0 0 85 0 0 0 0
TOT 0 0 2410 566 0 0 0
RECORDER 24 HR 976 G - 4

STA TYPE:0 0820157B1995
STA NO 082 0157

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA
TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE DIRECTION B
LOC RIVER ROAD #1 - EAST OF SILVER STREET

DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	0	0	907	908	0

TYPE

1995 ADT = 1300 ACF = NA

BEG

12A	0	0	0	0	0	3	0
1A	0	0	0	0	0	1	0
2A	0	0	0	0	0	3	0
3A	0	0	0	0	0	1	0
4A	0	0	0	0	0	4	0
5A	0	0	0	0	0	26	0
6A	0	0	0	0	0	265*	0
7A	0	0	0	0	0	150	0
8A	0	0	0	0	84	0	0
9A	0	0	0	0	36	0	0
10A	0	0	0	0	53	0	0
11A	0	0	0	0	69	0	0
12P	0	0	0	0	75	0	0
1P	0	0	0	0	63	0	0
2P	0	0	0	0	126	0	0
3P	0	0	0	0	151	0	0
4P	0	0	0	0	59	0	0
5P	0	0	0	0	34	0	0
6P	0	0	0	0	35	0	0
7P	0	0	0	0	18	0	0
8P	0	0	0	0	33	0	0
9P	0	0	0	0	8	0	0
10P	0	0	0	0	34	0	0
11P	0	0	0	0	42	0	0
TOT	0	0	0	0	920	453	0

RECORDER 073

24 HR 1373

G - 4

STA TYPE:0 0820252B1995
STA NO 082 0252

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA
TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE DIRECTION B
LOC RIVER ROAD # 1 - EAST OF EASTERN DRIVE
DAY SUN MON TUES WED THUR FRI SAT
DATE 0 0 0 0 907 908 0
TYPE
HOUR 1995 ADT = 200 ACF = NA
BEG *****
12A 0 0 0 0 0 2 0
1A 0 0 0 0 0 1 0
2A 0 0 0 0 0 0 0
3A 0 0 0 0 0 0 0
4A 0 0 0 0 0 0 0
5A 0 0 0 0 0 0 0
6A 0 0 0 0 0 6 0
7A 0 0 0 0 0 3 0
8A 0 0 0 0 11 0 0
9A 0 0 0 0 13 0 0
10A 0 0 0 0 16 0 0
11A 0 0 0 0 14 0 0
12P 0 0 0 0 16 0 0
1P 0 0 0 0 20* 0 0
2P 0 0 0 0 7 0 0
3P 0 0 0 0 13 0 0
4P 0 0 0 0 17 0 0
5P 0 0 0 0 17 0 0
6P 0 0 0 0 12 0 0
7P 0 0 0 0 10 0 0
8P 0 0 0 0 7 0 0
9P 0 0 0 0 8 0 0
10P 0 0 0 0 6 0 0
11P 0 0 0 0 2 0 0
TOT 0 0 0 0 189 12 0
RECORDER 075 24 HR = 201 G - 4

STA TYPE:0 0820261B1995
STA NO 082 0261

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY AND PLANNING
PLANNING INVENTORY AND DATA

TRAFFIC RECORDER DATA

TOWN OF MIDDLETOWN ROUTE DIRECTION B
LOC SILVER STREET - EAST OF EAST MAIN STREET

DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	0	0	907	908	0

TYPE

HOUR 1995 ADT = 4600 ACF = NA

BEG

12A	0	0	0	0	0	36	0
1A	0	0	0	0	0	27	0
2A	0	0	0	0	0	18	0
3A	0	0	0	0	0	5	0
4A	0	0	0	0	0	17	0
5A	0	0	0	0	0	29	0
6A	0	0	0	0	0	110	0
7A	0	0	0	0	244	0	0
8A	0	0	0	0	284	0	0
9A	0	0	0	0	336	0	0
10A	0	0	0	0	355	0	0
11A	0	0	0	0	385	0	0
12P	0	0	0	0	415	0	0
1P	0	0	0	0	330	0	0
2P	0	0	0	0	336	0	0
3P	0	0	0	0	408	0	0
4P	0	0	0	0	461*	0	0
5P	0	0	0	0	367	0	0
6P	0	0	0	0	254	0	0
7P	0	0	0	0	196	0	0
8P	0	0	0	0	142	0	0
9P	0	0	0	0	107	0	0
10P	0	0	0	0	71	0	0
11P	0	0	0	0	66	0	0
TOT	0	0	0	0	4757	242	0

RECORDER 067 24 HR = 4999 G - 4

0820264B1994
STA NO 082 0264

TOWN OF MIDDLETOWN		ROUTE		DIRECTION B			
LOC SILVER STREET - S.W. OF RIVER STREET # 1							
DAY	SUN	MON	TUES	WED	THUR	FRI	SAT
DATE	0	0	0	1019	1020	0	0

HOUR	1994	ADT	=	1600	ACF	=	NA
BEG	*****						
12A	0	0	0	0	5	0	0
1A	0	0	0	0	1	0	0
2A	0	0	0	0	2	0	0
3A	0	0	0	0	1	0	0
4A	0	0	0	0	26	0	0
5A	0	0	0	0	44	0	0
6A	0	0	0	0	309*	0	0
7A	0	0	0	0	196	0	0
8A	0	0	0	0	0	0	0
9A	0	0	0	0	0	0	0
10A	0	0	0	0	0	0	0
11A	0	0	0	0	0	0	0
12P	0	0	0	0	0	0	0
1P	0	0	0	0	0	0	0
2P	0	0	0	0	0	0	0
3P	0	0	0	0	0	0	0
4P	0	0	0	0	0	0	0
5P	0	0	0	0	0	0	0
6P	0	0	0	0	0	0	0
7P	0	0	0	0	0	0	0
8P	0	0	0	0	0	0	0
9P	0	0	0	0	0	0	0
10P	0	0	0	0	0	0	0
11P	0	0	0	0	0	0	0
TOT	0	0	0	0	0	0	0

RECORDER 025 24 HR = 1716 G - 4